



OPEN ACCESS

EDITED BY

Yen-Chiang Chang,
Dalian Maritime University, China

REVIEWED BY

Yitong Chen,
Ocean University of China, China
Tsung Han Tai,
Shandong University, China

*CORRESPONDENCE

Mehran Idris Khan
lfomd@hotmail.com

SPECIALTY SECTION

This article was submitted to
Marine Affairs and Policy,
a section of the journal
Frontiers in Marine Science

RECEIVED 28 July 2022

ACCEPTED 23 September 2022

PUBLISHED 06 October 2022

CITATION

Li W and Khan MI (2022) The practical
dilemma and solutions of international
ship-aircraft encounter rules on sea: A
Chinese perspective.
Front. Mar. Sci. 9:1005177.
doi: 10.3389/fmars.2022.1005177

COPYRIGHT

© 2022 Li and Khan. This is an open-
access article distributed under the
terms of the [Creative Commons
Attribution License \(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use,
distribution or reproduction in other
forums is permitted, provided the
original author(s) and the copyright
owner(s) are credited and that the
original publication in this journal is
cited, in accordance with accepted
academic practice. No use,
distribution or reproduction is
permitted which does not comply with
these terms.

The practical dilemma and solutions of international ship-aircraft encounter rules on sea: A Chinese perspective

Wei Li¹ and Mehran Idris Khan^{2*}

¹School of Law, Liaoning Normal University, Dalian, China, ²Department of Law, University of Sialkot, Sialkot, Pakistan

The fragmentation of international ship-aircraft encounter (SAE) rules has led to practical difficulties; as such, it is necessary to establish an integrated set of regulations for international SAEs. Based on the theoretical considerations of international law and the rules of the Code for Unplanned Encounters at Sea (CUES) and other SAEs, dispute resolution mechanisms such as international arbitration, diplomatic channels, the International Court of Justice, and Alternate Dispute Resolution have been carefully selected as implementation pathways. However, the global stakeholders are facing the fragmentation of such rules in different ways. To this end, this study thoroughly analyses the fragmentation of the international SEA rules and unresolved pertinent issues. While highlighting the reasons and potential threats of the fragmentation, the present paper also provides Chinese and global perspectives to resolve the issues with appropriate recommendations collectively. It concludes that such fragmentation of navigation rules and dispute resolution mechanisms—if effectively addressed with harmonising existing rules and unified international rules—can centrally resolve the encounters between ships and aircraft in the process of international voyages and form a basic, unified understanding of some of the most representative issues.

KEYWORDS

ship-aircraft encounter rules, integration, fragmentation, practical dilemma, solution pathway

Introduction

The scope of the international community's development and use of international waters has gradually expanded, which has correspondingly increased the probability of international entities' meeting at sea. The establishment of rules to integrate international subjects' maritime encounters should start from the objective structure of international waters, which are no longer limited to the 2D planar structure of ships and aircraft, and

should be extended to include ships and aircraft that navigate in international Oceans (waters beyond the territorial Sea) as well as the airspaces, respectively. The 3D structure of aircraft encounters means that a situation where international subjects meet at Sea is not an encounter of ships or aircraft in the traditional sense, but rather in a modern sense; such scenarios include encounters of 'ships' and 'aircraft' in addition to the aforementioned meetings. Therefore, developing regulations for integrated international maritime 'ship' and 'aircraft' encounters is a common issue that cannot be avoided in contemporary global society. Limited by the level of human science and technology, there used to be no intersection in the space of action between 'ships' and 'aircraft', so it was not easy for the two entities to meet. With the advancements of modern technology, technologies such as 'ships' and 'aircraft' have become more mature and widely used. On the high seas, the Internet and modern communications technology have greatly improved the convenience of communication between ships and aircraft (Lehto, 2020; Yau et al., 2020). The ontology of 'ships' and 'aircraft' has expanded to include radar signals for commanding actions. The contact of more than one tangible body with another is extended to mean that the existing navigation routes may be affected by each other. In China, establishing rules for integrating ships and aircraft has become an important issue that urgently needs to be resolved in international waters (People's Daily, 2015b).

Similarly, it is becoming increasingly important to have a frictionless process where the mobility of resources, goods and services flows seamlessly across borders. For this purpose, there is a need for better coordination of transport infrastructure and appropriate rules, including ships and aircraft encounter rules (Nikolai et al., 2019; Rochwulaningsih et al., 2019). This integration can improve business relationships and transform the global supply chain. It could also transform how the resources and capabilities of this environment can become more collaborative in the contemporary machine economy (Koh et al., 2020). Therefore, it makes the integration of ships and aircraft encounter rules an important issue globally, especially in international waters, which requires abrupt attention by the global stakeholder and further research and innovation.

Maritime transport is one of the major forms of world trade, accounting for more than 90% of global trade in goods (Chang & Khan, 2019). Collisions between ships (and aircraft) is an important type of maritime accident which often cause sizeable casualties, economic losses and environmental pollution (Novikova et al., 2022). Although ships have very advanced equipment (i.e., Integrated Navigation Systems, Automatic Radar Plotting Aids, Automatic Identification Systems, and so on), it is noted during maritime accident investigations that more than 80% of maritime traffic accidents are caused due to human factors, which do include not only the anthropogenic activities but also the rules and policies

formulation to describe and govern the state responsibilities, i.e., navigation rules, SEA rules, CUES rules (Wu et al., 2017; Yıldırım et al., 2019). Therefore, the impact of such rules, regulations and policies on accidents still plays an important role (Fan et al., 2018; Fan et al., 2020a; Fan et al., 2020b). One earlier solution to this issue was, for example, the International Maritime Organisation (IMO) published the International Code for Avoiding Collisions at Sea in 1972 (IMO, 1972), which sets out navigation rules and concepts related to ships; it entails all ships on international journeys to comply with the Convention (Hu et al., 2020). Studies concerning ship collision risk modelling and risk analysis have become important research interests in recent decades (Du et al., 2020; Huang et al., 2020; Huang & Gelder, 2020), providing the basis and precondition for the avoidance of collisions at global levels during the ships-aircraft possible encounters during the international voyages.

This paper follows the qualitative content analysis method and critically analyses the research gap concerning the international ship-aircraft encounter rules on the Sea. After providing an introduction and background of the subject matter, section two of this study discusses the fragmentation of international SAE rules and unresolved issues and addresses the relevant questions, i.e., can the rules of SAEs be unified? Can the rules of military and non-military encounters be unified? Can bilateral (including multilateral) SAE rules between international entities be unified? Whereas section three presents an evaluation of the practical dilemma of establishing rules for international SAE integration; it also analyses that the separation of maritime and aircraft legislation affects the process of unifying rules, the level of effectiveness of bilateral and uniform rules is unknown, and there is a conflict between the special rules of warships and aircraft and unified rules. Section four deals with the actionable recommendations, followed by the discussion and clouding remarks in sections five. Through this framework, the present study provides a to-the-point analysis of the international SEA rules along with their shortcomings, and offers concrete recommendations to resolve the issues.

Sections on assessment of policy and implications

The fragmentation of international SAE rules and unresolved issues

It is noteworthy that current international law is characterised by the development of specialised groups of rules. The scholarly discussions of these self-contained regimes tend to emphasise the idea that these specialised groups of rules are distinct from general rules of international law; they have their own resources and mechanisms to apply in the event of non-compliance, and their own tribunals and courts to resolve disputes (Treves, 2007). The existence of such regimes and the

proliferation of international tribunals and courts raise apprehensions about a possible fragmentation of international law.

Similarly, Anete Logina (Logina, 2009) explains that international maritime security law is fragmented, and definitions describing unlawful violence at sea are unclear. This jungle of diverse obscure impressions in dissimilar normative acts which in fact address the same issue – the issue of illegal violence at sea – considerably originates fragmentation of international law and, therefore, vagueness and uncertainty as to the rights and obligations of the authorities responsible for combating specific violence at sea, in particular, the collusion of ships and encounters with aircraft (Logina, 2009).

In addition, more than a decade after the publication of a report by the UN General Assembly—'fragmentation' of the International Law Commission—a study by Gilbert Guillaume mentioned that it is time to bury the word 'f' (referring to the fragmentation) and say goodbye to fragmentation (Andenas, 2015). Ultimately, this will help to emphasise the positive contributions of new techniques that the international tribunals, courts and other actors have established to coordinate different areas of international law.

Moreover, realist analysis has described the fragmentation of international law as the result of a deliberate programme of influential states (Benvenisti & Downs, 2007). Benvenisti and Downs have argued that fragmentation of international law serves the interests of the latter because it restricts the negotiating power of weaker states and because only states with larger agenda-setting influence can certainly create substitute regimes better suited to their interests. There could be four distinguished fragmentation strategies: i) avoiding the creation of authoritative institutions (courts, administrations), ii) *ad hoc* negotiations (no mechanisms for updating agreements), iii) avoiding broad regulatory regimes, and iv) regime change, i.e., creating a new regime as soon as the original regime works too much in the interests of weaker states or against the interests of powerful States (Peters, 2017).

The international community has made active efforts to create rules for the integration of international SAEs. The main results are the 14th Western Pacific Naval Forum Annual Meeting, which was proposed by Australia and New Zealand in 2000 and hosted by the Chinese Navy in 2014. The 'Maritime Encounter Rules' (hereinafter referred to as the CUES Rules) were subsequently adopted. As for the fragmentation of SEA rules, CUES Rules is a document that the world's navies choose to adopt on a non-binding and voluntary basis. As a result, there is no arbitration mechanism provided for disputes resulting from such incidents between military ships or aircraft (CUES, 2014). Additionally, CUES Rules focus primarily on warship security procedures rather than warplanes. However, CUES Rules are only applicable when different States' ships and aircraft meet 'accidentally or unexpectedly'; nevertheless, most

of such incidents at Sea occur when ships and aircraft of one State intentionally act in a manner that poses potential threats to the security and safety of ships and aircrafts of other States (US Department of Defense, 2014). The reality, then, is that in order to protect maritime claims over disputed territories and sovereignty, ships and aircrafts of the States usually involved, intentionally, and not unexpectedly, support or harass each other. However, CUES Rules do not prohibit certain acts of military intimidation (Ton, 2017). Also, CUES Rules only recommend actions, including 'simulating attacks by firearms, torpedo tubes, fire control radars, missiles, or other weapons toward ships or aircrafts encountered ... can typically be avoided' (CUES, 2014). This empowers the ship commanders to determine themselves how they will/may enforce CUES Rules under certain circumstances.

At present, the SAE rules in the international community are fragmented. This is the main problem that affects the construction of a standardised international navigation order. There are two feasible ideas to solve this problem: one is to construct maritime and air, military and non-military, and multiple bilateral encounter rules separately; the other is to formulate unified international society SAE regulations and to use diplomatic means to promote them. Apparently, the latter can save judicial resources, build a standardised international navigation order, and improve the efficiency of global navigation. However, the following three basic problems remain.

Can the rules of SAEs be unified?

The concept of the 'ship- aircraft' is divided into 'ship' and 'aircraft'. The general rule about meetings between the two is the prerequisite for discussing how to develop regulations for the future. The basis for unifying maritime and air encounter rules not only entails the gradual integration of navigation tools between sea and air in a broad sense; in addition, the navigation process between Sea and air should be improved due to the use of communication equipment, which is supported by Internet technology. There is the ability to avoid mutual interference (Thomas and Kirk, 2011). Compared with aviation technology, shipping informatisation and automation technology are generally applied later. At this time, encounters between Sea and air involve signal propagation space crossing, and there is a need to determine the reasonable order of signal propagation. Also, whether by Sea or air, the navigation rules may unreasonably interfere with Chinese authorities to better fulfil relevant international responsibilities and obligations (Valencia and Akimoto, 2006; Mahbub, 2020; Zhang et al., 2021), i.e., China's construction on the Nansha islands (People's Daily, 2015a). The basis for unifying maritime and air encounter rules lies in the 'borderlessness' of technical ontology (Wang, 2011).

Can the rules of military and non-military encounters be unified?

The possibility of applying the same rules in military and non-military encounters is a prerequisite for discussing how to develop regulations. The main problems of the current military SAE rules are unclear and undisclosed. This is necessary because the special status of military ships and aircraft requires the application of regulations that are more convenient for protecting military rights. The main problem in developing unified rules for military and non-military ships lies in regulating the special order of navigation after two types of ships and aircraft meet, as well as in the issue of efficient dispute resolution mechanisms to protect rights following encounters between ships and aircraft. However, based on the analysis of this study, it may not be considered a proposition of possibility, but a proposition of necessity to discuss the construction of unified rules for military and non-military ships and aircraft. The most significant difference in the identity of the subject of international navigation encounters is not the country, but the purpose. All military-related disputes are resolved through diplomatic channels (Zhang, 2013), and it is rare for the parties to specify the rules for encountering in advance, which can sometimes lead to a waste of resources in diplomatic procedures (Zhao, 2012). The establishment of the SAE norms involving military identities is intended to create necessary partial dispute resolution mechanisms to simplify the procedures for dispute resolution through diplomatic channels.

Can bilateral and multilateral SAE rules between international entities be unified?

At present, there are no unified rules applicable to most subjects of international relations in a global society. It is necessary to establish internationally used integration rules for SAEs. From the perspective of the development path of the rules for encounters between ships and aircraft in the international community, the gradual unification of rules for such meetings is inevitable. For example, the scope of application of the CUES rules has gradually expanded. Discussing the characteristics of multilateral international entities, coordinating existing SAE rules to expand the scope of their application, and even creating brand-new SAE rules are the basic or even minimum requirements to reduce global navigation conflicts effectively. This does not mean that new and unified SAE rules can completely replace the existing bilateral ones, but unified regulations should be slowly developed from two perspectives: On the one hand, it is appropriate to establish hierarchical SAE rules for the time being. That is, under the premise of no other relevant international entities, the bilateral SAE rules take precedence over the unified encounter rules. On the other hand, in addition to special requirements, the bilateral rules

can be improved and promoted in accordance with the unified ones until they are unified. The rules match; therefore, the establishment of unified SAE rules between international entities is both a basic task and a serious challenge. The problem lies in how to ease the relationship between special and unified rules.

The practical dilemma of establishing rules for international SAE integration

The establishment of rules for the integration of international SAEs still needs to start with the advancement of the CUES rules, and the problems that need to be resolved are the gradual relaxation (and even integration) of generality and particularity, especially exploring the integration of the binding effect of bilateral and general rules. The issue of effectiveness, as well as the effective connection between the special rules of military ships and aircraft and the general rules, are at least the issues of effective compensation for losses.

The separation of maritime and air legislation affects the process of unifying rules

There is a phenomenon of wanting to depart from the maritime and air legislative process (Tang and Si, 2013). In essence, this issue can be summarised as a phenomenon where China's maritime and land legislation want to be separate because national air legislation and laws have adopted a set of legal systems for a long time. China does not have a special air legislation system. The particularity is manifested only in the adjustment of special laws and regulations related to aviation, in which the legislative guiding concept is exactly the same as that of land-based legislation. At present, China's maritime legislation tends to be independent of land legislation or academic appeal. The main reason is that maritime legislation occurs far earlier than air legislation. Maritime legislation, especially maritime law, formed unique legal documents in the Middle Ages. The present study does not intend to evaluate the issue of independence of maritime legislation, but from the perspective of SAE rules, it is more suitable to adopt a legal system consistent with maritime and air laws; otherwise, it will be difficult to create unified behavioural norms.

In contemporary society, China's emphasis – being one of the major maritime stakeholders globally (Bao et al., 2021) – on the establishment of a maritime power system does not mean that China needs a maritime legal system that is completely independent of land-based legislation. China's emphasis on the legislation of the ocean cannot ignore its connection with land-based regulations. Maritime legislation only focuses on

maritime-related disputes, but it should also be based on the basic legal principles that develop from land to sea (Ye, 2000). The development of China's marine industry is naturally closely related to the land; coupled with the technological achievements in the Internet era mentioned in the previous sections, navigation technologies such as unmanned ships and unmanned aerial vehicles are becoming more mature, and the behavioural patterns of maritime and air navigation are different; however, it is gradually shrinking (Xu, 2014). Unified SAE rules are inevitable, but the unique development results of maritime legislation over the years must not be ignored. Coordinating the commonality and characteristics between the two has become a difficult problem that needs to be taken seriously in the journey of unified SAE rules.

Besides, the regulatory aspects of maritime security and law enforcement should be implemented through the harmonisation of legal systems and legislation, the rapid determination and establishment of national borders on land, sea and aircraft rules, and an emphasis on the navy as the primary responsibility for maritime security and safety (Batongbacal, 2019; Kadrimi, 2020; Suwardi & Fakhruulloh, 2022). Therefore, it merits unifying maritime and air legislation for better international coordination across sectors (Zampella, 2019). Similarly, this notion also bases on the provisions in Chapters II, III, and IV UNCLOS 1982 (UNCLOS, 1998), which mentions that the coastal States have sovereignty over inland waters, islands and territorial seas, where waters is a strait, and the air space above it, which provides enough room for the appropriate and unifying maritime and airspace legislation.

The level of effectiveness of bilateral and uniform rules is unknown

The current international SAE rules mostly adopt a bilateral negotiation-style formulation process. The current situation of numerous international entities makes it difficult to effectively determine the effectiveness of bilateral and unified rules (Gales and Florea, 2014). A large number of international entities call for unified encounter rules to be preferred to bilateral ones. There are currently hundreds of sovereign countries in the international community. Some landlocked nations might not only be involved in the issue of military aircraft encounters, but also use the flag of convenience systems to enhance their international influence (van Fossen, 2016). This makes the situation of international aircraft encounters on the high seas more complicated (Zhang and Zheng, 2010). In the era of a lack of unified international rules for handling disputes, global conflicts are usually resolved through diplomatic channels or bilateral rules. The advantage of this approach is that the solution to the problem is strongly oriented, and when the results of the settlement meet the expectations of both parties, further disputes rarely develop (Gu, 2013). However, the main

problem of this type of solution lies in its inefficiency, and its scope of application is greatly restricted.

All of these conflict resolution maxims form a relationship of mutual exclusivity of numerous treaties. A study by Gunther Teubner mentions that this 'strictly heterarchical conflict resolution', which comes in two methods – either internalising disputes into regime decisions or subcontracting the disputes to 'inter-regime negotiations'; however, it is the only 'meta-constitutionalism' available from international realm (Teubner, 2012).

Any issues involving third-party international entities will lead to a downgrade of the effectiveness of bilateral rules because at this time, the results of applying bilateral rules to resolve disputes may be different. It is completely accepted and invalid by third-party international entities. An increase in the number of international entities means an increase in diplomatic costs and the extension of the cycle. It is necessary to extend bilateral encounter rules to multilateral encounter rules to improve efficiency.

There is a conflict between the special rules of warships and aircraft and unified rules

It is noteworthy that a tribunal charged with disputes settlement concerning the application and interpretation of a particular treaty cannot do so by considering that treaty in isolation. Article 293 of the LOS Convention bounds the International tribunals and Courts called upon to decide disputes under the Convention, according to which the applicable law to these disputes is constituted by the Convention and other rules of international law which are not incompatible with it (Los Convention, 1982).

International law, including the Charter of the United Nations, guides the States when they seek to safeguard their diplomatic and national security interests in the maritime environment in peacetime. Article 2(3) of the Charter, as a starting point, states that 'all Members shall peacefully settle their international disputes so as not to endanger international justice, security and peace (Walsh et al., 2017). In addition to disputes concerning the associated/disputed maritime claims and sovereignty – differing interpretations of the various provisions of international law, in particular the LOS Convention – have also led to multiple incidents at sea (Ton, 2017).

In the same vein, the particularity of military warships is manifested in their special identity. The army is a symbol of the country, which makes it extremely difficult to unify settlement disputes between military warships of different countries or between military and non-military warships. The particularity of military ships and aircraft is manifested in two aspects: First, the rules of action for military ships and aircraft are secretive. Second, the special status of the military requires that the normal international order of military ships and aircraft not be

interfered with by other factors in principle (Wang and Wang, 2011). The aforementioned two points mean that the encounters of navigation subjects involving military identities should be subject to the jurisdiction of the country's sovereignty. When this type of ship meets other ships and aircraft, the collision avoidance problem must be resolved promptly based on the essential premise of full respect for the military sovereignty of other countries. Therefore, to a certain extent, it is reasonable to apply the special rules of the sovereign State of warships and aircraft. Two points are worth discussing here. One is the flexibility of the special rules of one of the sovereign States when the two encounters are both military warships and aircraft. The principle of sovereign equality will make it difficult to respect the encounter rules of the respective countries of military ships and aircraft simultaneously. This requires the world to consider the equal international status of sovereign States fully. Another point is that when only one party to the encounter is a military aircraft, the preconditions for applying the country's special rules are drawn up at the level of international norms, either the general global rules or the loss compensation mechanism. This means that if the military aircraft involves the encounter rules, priority is given to the country's special regulations, but at the same time, it should be ensured that there is a mechanism to compensate for the losses of non-military warships and aircraft.

The dispute resolution mechanism involving military SAEs is the top priority of unified SAE rules, and is also the focus of the dispute resolution mechanism for SAEs. The problem of encounters between ships and aircraft with military status differs from the problem of encounters between civilian ships and aircraft. The latter means that both sides are military ships and aircraft, while the former indicates that only one side of the encounter is a military ship or aircraft, and correspondingly the other side. It should be a non-military ship. The resolution mechanism for SAE disputes involving military status is different from the general or completely non-military SAE dispute resolution mechanism. The latter only needs to respect the established rules of international navigation. The reason for emphasising the equality of sovereignty in the issue of warship and aircraft encounters with military status is that the navigation rules of military ships and aircraft should have their own particularities. Military activities symbolise national sovereignty and the ultimate guarantee of national security (Devlaeminck, 2018). Based on the above discussion, this study considers that non-military activities give way to military activities to respect national sovereignty.

Actionable recommendations

From a legal point of view, the construction of integrated international SAE rules should be based on perfecting China's basic work to promote the establishment of such rules and to

determine the basic concepts of creating them. In view of this, it is necessary to gradually advance the development of integrated SAE rules. To this end, the following points could be helping.

Harmonizing existing domestic rules and unified international rules

When Chinese warships encounter American ones, they actively choose to communicate in English and agree to apply the CUES rules to the Association of Southeast Asian Nations (ASEAN) countries in the South China Sea. This open attitude should be viewed dialectically because it does not represent the future integrated ship-to-ship encounter rule and architecture model.

(1) Regarding the dialectical selection mechanism of the pros and cons of the CUES rules, in response to the language selection problem in future encounter rules, the author suggests that future unified ship-aircraft encounter rules adopt the technical specification of symbols instead of language. First, it is very difficult for all or most of the navigation management personnel of international entities to uniformly accept a certain language, and common navigation symbols are more convenient and feasible as communication tools. In the Internet era, the application of data and information has gradually deepened, which provides technical support for the author's suggestions. It is not only Internet communication equipment that uses language codes composed of 0s and 1s, but also traditional communications technologies (Wang and Wen, 2012). Therefore, drawing up the corresponding SAE situations, reaching a consensus on standards in advance in such situations, and then formulating a specific action message code, could significantly improve handling disputes.

Regarding the issue of military status in future encounter rules, this paper suggests that the discussion should be divided into different scenarios on the premise of fully respecting military sovereignty. Regarding circumstances where the two encounters involve both military warships and aircraft, it is believed that the principle of sovereign equality should be followed; that is, the priority of military warships and aircraft entails an equal opportunity to pass. Specifically, the first encounter between a military ship and an aircraft should abide by the rules of encounters between two non-military ships and aircrafts. The military ship and aircraft that have passed the first encounter shall take the initiative to evade the other party's aircraft and aircraft.

Regarding a situation where the encountering party has military status, priority should be given to military ships and aircrafts to pass under the premise of respecting military sovereignty. Ships and aircraft that conceal their military status have no priority to pass, and the unified ship-to-aircraft encounter rules should formulate corresponding penalties for acts of pretending to have military status.

Regarding conflicts of domestic and international rules in future encounter rules, it should be considered that China and ASEAN countries can apply the CUES rules when they meet in the South China Sea, which does not have absolute guiding significance for unified SAE rules. China's application of the CUES rules has special historical reasons; that is, China has not yet participated in the process of promoting the construction of international unified SAE rules, and the issue of SAEs in the South China Sea urgently needs to be resolved. It should be recognised that the CUES rules will have guiding significance for the formation of unified ship-to-ship encounter rules in the future. However, given China's particularity, as mentioned above, China should promote the process of developing distinctive integrated ship-to-ship encounter rules under the premise of considering its own particularity.

(2) To promote the effective implementation of international SAE rules advocated for and led by China, maritime encounter rules are not only affected by the system of crew, ships, and the environment, but also restricted by the specific behavioural requirements of the collision avoidance rules regarding collision avoidance action in a cross-encounter situation. Overall, three questions need to be considered during each encounter: when to act, how to act, and the consequences of the action. The rules that are purely applicable to domestic SAEs are more comprehensive and independent. The need for integrated construction of domestic and international SAE rules is an important problem in the process of establishing unified SAE rules. Some of the existing international standards are not China's leading construction. One of the reasons why China joined the CUES rules many years after they emerged is the process of considering the relationship between the particularities of China's existing rules and the CUES rules. Even if China has become a member of the CUES rules, it is inevitable that when dealing with domestic and international disputes, the rules cannot be uniformly applied due to complex regulations. The inefficiency in handling disputes is unavoidable. The complex international shipping environment and the differences within China make it necessary to completely implement the navigation order that China already has in the international community. Overreliance on the existing rules of encounters or the rules that China has not participated in the formulation of will severely impact China's existing navigation order. China's open attitude and the fact that ASEAN countries agreeing to apply the CUES rules in the South China Sea indicate that the navigation order within China may be in line with the international community. Undoubtedly, in principle, it is more convenient for China's ships and aircraft to adopt similar rules when they meet in the South China Sea. This has increased China's workload to adjust its own navigation order. In this way, the author believes that China's active participation in the formulation of the rules of international SAEs cannot only guarantee China's international voice, but also effectively promote China's internal navigation order in line with

international standards, and consequently reduce legislative costs.

Carefully choosing a diversified SAE dispute resolution mechanism

The optional modes of SAE dispute resolution mechanisms are mainly diplomatic channels, international court trials, and international arbitration awards. The analysis is as follows:

(1) Diplomatic channels are low in efficiency and opaque in procedures (Kim et al., 2018; Najaf and Najaf, 2021). It is also the traditional basic mode for resolving SAE encounter disputes. Diplomatic channels are the basic means for international entities to resolve international disputes and are the most guaranteed. Even after creating and improving a special global arbitration system to settle SAE disputes, diplomatic channels can also be used to resolve such disputes (Jandhyala, 2020). The establishment of a special international arbitration system can, first of all, resolve universal, principled, and transparent disputes. The diplomatic channel represents the authority of the subject of international sovereignty and should provide a due guarantee in the case of SAE disputes (Mao and Gan, 2012). The limitations of diplomatic channels are manifested in two aspects.

First, the operating model of diplomatic channels that rely on bilateral and multilateral settlement of disputes; one by one will result in excessive inefficiency (Zhao, 2013). Because the diplomatic approach is essentially a negotiation activity made by international entities relying on their sovereign identity, its main mode of operation is to place disputes among equal international sovereign entities for negotiation. The diplomatic approach is highly targeted, and its final settlement results are quite stable and unchangeable (Yackee, 2019). However, the period of the diplomatic channel is relatively long, mainly due to the procedural nature of the diplomatic channel itself (Mo, 2013). The most prominent characteristic of this procedural nature is the results-oriented doctrine; that is, the final outcome of diplomatic channels has considerable decisive significance. In other words, the prerequisite for a diplomatic result to be complied with is that both parties must mutually accept it. Unless other influencing factors exist, the diplomatic result will not be unfavourable to one party, and the party voluntarily accepts it (Song, 2014). This is also a natural flaw in the negotiation and dispute resolution model between the two parties.

Second, there is no transparent procedure for diplomatic channels, which is also an important factor affecting the purity of diplomatic results. In other words, the arbitrariness of the outcome of diplomacy, and the regularity of the outcome of dispute resolution between ships and aircraft, present a natural contradiction: The outcome of diplomacy is only the collision and fusion of interests between sovereign subjects, and its strong pertinence only solves the problems between opposing subjects.

The results of the dispute resolution of SAEs have obvious guiding significance; that is, the rules applicable to such results will, in principle, be incorporated into the unified international SAE rules in the future. In this way, the positive significance of the principle of procedural justice is self-evident.

(2) The International Court of Justice's (ICJ) construction goal makes resolving conflicts difficult (Herbert, 2021). The reasons why the ICJ is not suitable for inclusion in the international SAE dispute resolution mechanism are reflected in two aspects. First, the characteristics of the ICJ prevent it from becoming an immediate solution. Another feasible option for SAEs and rectifications is that the passive nature of international 'judicial' activities or the hysteresis of international practice itself causes the ICJ not to be applied to the dispute resolution process of international SAEs.

The first question is whether the key factors that affect the participation of the ICJ in international dispute resolution are manifested in three aspects: the basic functions of the ICJ, the existing international practice of judging SAE disputes, and the litigation costs and the cycle of the ICJ. Obviously, all three aspects hinder the ICJ's function to solve a particular problem between international subjects. There are no uniform SAE rules, so even the existence of the ICJ will not perform its basic functions. In addition, the high litigation costs and long operating cycles of the ICJ are contrary to the requirement that SAE disputes need to be resolved quickly (Gong, 2012). Therefore, the ICJ is not the optimal SAE dispute resolution mechanism.

The second question is that international 'judicial' activities have a strong passive nature. They can provide help to improve SAE rules, but make little contribution to their formation. The prerequisite for an SAE dispute to be properly incorporated into the proceedings of the ICJ lies in the existence of a clear SAE rule as the basis for judgment. The law itself has the characteristic of hysteresis, and the emergence of international conventions is inseparable from the long-term accumulation of basic principles and customary rules (Wulan, 2012). If the ICJ wants to play a role in SAE disputes, it should generally adopt the existing basic principles for resolving SAE disputes to further extend it after establishing unified SAE rules.

However, compared with diplomatic channels, the main advantage of the ICJ is that it introduces an unrelated third party as an intermediate referee to resolve disputes, and the referee has authority (Messineo, 2019). This means that if the certainty of the referee's outcome is not favourable to a party, that party shall, in principle, bear the outcome. The chief task of the ICJ is to ensure procedural justice and the correct application of laws. This needs to ensure the authority of the ICJ, so it is not appropriate to put it into the SAE dispute resolution mechanism before promulgating the SAE rules. A more appropriate method is a comprehensive approach that integrates the arbitrariness of diplomatic channels and the authority of the ICJ.

(3) International arbitration can be considered an effective dispute resolution mechanism. Consider international arbitration as the current effective mechanism for resolving SAE disputes. First, international arbitration can achieve a relatively high level while maintaining the necessary procedures. Current international arbitration generally adheres to the necessary procedures in the process of resolving international disputes. It is an important feature of the arbitration system, similar to the litigation system. Compared with the litigation system, the arbitration system is more efficient because the 'one arbitration' adjudication model can save procedural resources.

The second international arbitration is the best way to explore the rules for resolving SAE disputes when unified SAE rules have not been issued. The promulgation of unified SAE rules is a long-term strategy involving multiple factors, especially when unified SAE rules are a historical node that is still a correct concept, but has not been put into practice. The specific formulation process of technical factors is in a blank period, which also means that there is more room for discussion. An obvious difference between the arbitration and litigation systems is that the degree of criterion dependence is lower, which indicates that the arbitration system pays more attention to the relationship between procedural justice and results-oriented justice. The arbitration procedure provides space for both parties to negotiate and draft referees. The more they lack the basis for a referee, the more they can negotiate and issue a convincing judgment for both parties. Customary law is an important source of law, and drafting dispute resolution through negotiation is a crucial way to accumulate and precipitate superior rules (Zheng, 2012). Based on this analysis, this study finds that the process of introducing unified rules is not only a long-term solution, but also a process of cultural integration between the common and civil law systems. Therefore, it is necessary to accumulate SAE dispute resolution mechanisms before reaching an international agreement to formulate unified rules jointly. Experience and negotiating the technical provisions of specific rules when uniform rules are formulated are undoubtedly the only way to introduce uniform rules.

Of course, we should also be aware of the shortcomings of international arbitration in handling disputes over encounters between ships and aircraft. The main reasons are as follows:

First, there is a lack of unified international rules for encounters between ships and aircraft as the basis for refereeing. It is an inevitable trend for the international community to build SAE rules jointly. However, the process of formulating unified rules remains to be explored, even if it is based on expanding the scope of application of CUES rules advocated for by the academic community, based on the existing experiences of countries such as Norway and Canada. For reference, it can only be called a feasible way of thinking (Zheng, 2016). This affects the design of the basic concept of

the arbitration system because the arbitration system should first ensure the basic direction of the arbitration result during the time period when the arbitration system serves as the promulgation of uniform rules.

Second, the applicable object of international arbitration needs to be clarified. In the traditional sense, the objects of the arbitration system generally only include independent entities involved in public or private matters. However, the arbitration system for SAE disputes needs to face a major issue, i.e., how to resolve military status-related SAE disputes. Also, there is the problem of encounters between public and private subjects.

Third, the adjudication concept of international arbitration needs to be updated. The changes in Internet technology to social life and social concepts will inevitably affect the judging concept of international arbitration. Internet technology has actually made the problem of encounters between ships and aircraft more complicated and has correspondingly increased the difficulty of resolving related disputes. The current contradiction between the speed of Internet technology development and the law's lagging nature is manifested in all aspects of society (Wang, 2014), and although SAE disputes are only the tip of the iceberg, they cannot be ignored. The issue of SAEs does not exist independently in international exchanges, and the proper resolution of SAE disputes does not only rely on the formulation of uniform rules. It is closely related to the Internet technology application guidelines at the international level or only the applicable principles. The special positioning of the arbitration system is to resolve the contradiction between its traditional adjudication concept and cutting-edge technology.

Discussion and conclusion

From the perspective of the introduction of unified ship-aircraft encounter rules, the ship-aircraft encounter dispute resolution mechanism should be earlier than the unified rule, and from the perspective of unified ship-aircraft encounter rules' ontology structure, the dispute resolution mechanism should not belong to unified rules. The indispensable part should be promulgated earlier than the uniform rules. There are three main reasons: one is the needs of the times; that is, the current international shipping environment has increased the probability of encounters between ships and aircraft, and correspondingly increased the potential for disputes between ships and aircraft. Precautionary measures are far more economical than relief measures after an event. Cost: Both are the requirements of the ruling body; that is, the structure of the rule itself is a comprehensive and long-term work, which involves the formulation of navigation rules, the selection of responsibility modes, the comparison and selection of dispute resolution mechanisms, all of which require that the international parties participating in the unified rules first reach a basic international cooperation agreement, and

exchange the basic principles of the unified rules before reaching a consensus. The dispute resolution mechanism is an essential part of it; the three are the requirements of the dispute resolution mechanism, and the dispute resolution mechanism itself. It belongs to procedural rules and does not involve the substantive content of the unified rules. To a certain extent, the two have their own independence. The dispute resolution mechanism plays an important role in promoting the promulgation of uniform rules. The main reason is that there are few existing international dispute resolution mechanisms, especially maritime dispute resolution mechanisms. It can even be said that this is in line with the basic rules of human understanding of dispute resolution mechanisms: either two parties negotiate or a third party is in the middle of the referee (Gao, 2013).

China claims that it shoulders more international obligations and responsibilities, including search and rescue, fisheries, ecological conservation, meteorological observation, mitigation and disaster prevention, navigation safety, and security services. China designed them to provide better services to ships from China and neighbouring countries, as well as ships and boats from other countries crossing the South China Sea (Yunbi, 2015b). On the other side of the coin, US officials have recently claimed that fair dispute resolution and freedom of navigation are being challenged by various naval activities by the Chinese in the South China Sea. However, the Chinese authorities assure that the freedom of navigation and overflight in this region have never been influenced or impacted by such disputes, and that the maintenance and construction of facilities on the Chinese garrison islands and reefs will not affect undermining coastal states' freedom of navigation (Yunbi, 2015a). It should be noted here that China is also taking a defensive stance, i.e. China has accused some coastal States, including the Philippines of illegally occupying some islands and reefs in the Nansha Islands (Yang and Zhang, 2021). Ultimately, speculation arose as to whether China would set up an Air Defence Identification Zone in the South China Sea once maintenance or construction is completed, which China claims to have the right to establish, making it clearer that this has nothing to do with territorial issues or maritime disputes. This is because the Chinese side assumes that this position has a sufficient legal and historical basis, and there is no need to reinforce it with such construction activities on islands and reefs (Hayton, 2018). Therefore, such disputes and speculations may hamper the Chinese legal rights, and accordingly, navigation rules interfere with and may influence China's construction activities and fulfil relevant international responsibilities and obligations.

The dispute resolution mechanism can centrally resolve the encounters between ships and aircraft in the process of international voyages and form a basic, unified understanding of some of the most representative issues. The formation of such substantive rules conforms to the development law of maritime

rules because, from the point of view of the origin, most of them belong to the summary of optimised rules for resolving disputes in the navigation process, and all the long-lived dispute resolution mechanisms are advantageous rules. What needs to be done is to screen and optimise the most suitable procedural mechanism for resolving SAE disputes.

Author contributions

WL deals with mainly the write-up and proofreads; while MIK deals with the revisions, write-ups, general guidelines and proofread; both authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

References

- Andenas, M. (2015). *A farewell to fragmentation: Reassertion and convergence in international law (Studies on international courts and tribunals). 1st Edition*. Ed. E. Bjorge (Cambridge, United Kingdom: Cambridge University Press).
- The "Rules of encounters at sea" should not be misinterpreted. Available at: <http://news.163.com/14/0425/02/9QL2S2J400014AED.html>.
- Bao, J., Li, Y., Duan, Z., Li, T., and Zhang, P. (2021). Key factors affecting the quality of maritime education and training: empirical evidence from China. *J. Navigation; Cambridge Univ. Press* 74 (2), 396–408. doi: 10.1017/S0373463320000740
- Batongbacal, J. L. (2019). "Archipelagic states and maritime navigation: Perspectives and state practice of the Philippines," in *Regulation on navigation of foreign vessels* (The Netherlands: Brill), 115–127. doi: 10.1163/9789004396272_008
- Benvenisti, E., and Downs, G. W. (2007). The empire's new clothes: Political economy and the fragmentation of international law. *Stanford Law Rev.* 60 (2), 595–631. doi: 10.2307/40040417
- Chang, Y.-C., and Khan, M. I. (2019). China–Pakistan Economic corridor and maritime security collaboration: A growing bilateral interests. *Maritime Business Rev.* 4 (2), 217–235. doi: 10.1108/MABR-01-2019-0004
- CUES (2014) *Code of unplanned encounters at sea: Confidence, trust and the CUES. centre for international governance innovation*. Available at: https://maritimesafetyinnovationlab.org/wp-content/uploads/2016/12/cues_2014.pdf.
- Devlaeminck, D. (2018). Revisiting the substantive rules of the law of international watercourses: an analysis through the lens of reciprocity and the interests of China. *Water Policy* 20 (2), 323–335. doi: 10.2166/wp.2017.069
- Du, L., Goerlandt, F., and Kujala, P. (2020). Review and analysis of methods for assessing maritime waterway risk based on non-accident critical events detected from AIS data. *Reliab Eng. Syst Saf.* 200 (April 2018), 106933. doi: 10.1016/j.res.2020.106933
- Fan, S., Blanco-Davis, E., Yang, Z., Zhang, J., and Yan, X. (2020a). Incorporation of human factors into maritime accident analysis using a data-driven Bayesian network. *Reliab Eng. Syst Saf.* 203, 107070. doi: 10.1016/j.res.2020.107070
- Fan, S., Zhang, J., Blanco-davis, E., Yang, Z., Wang, J., and Yan, X. (2018). Effects of seafarers' emotion on human performance using bridge simulation. *Ocean Eng.* 170 (August), 111–119. doi: 10.1016/j.oceaneng.2018.10.021
- Fan, S., Zhang, J., Blanco-davis, E., Yang, Z., and Yan, X. (2020b). Maritime accident prevention strategy formulation from a human factor perspective using Bayesian networks and TOPSIS. *Ocean Eng.* 210 (November 2019), 107544. doi: 10.1016/j.oceaneng.2020.107544
- Galeş, N., and Florea, D. (2014). The creation of international law during the feudalism. *Proc. - Soc. Behav. Sci.* 149, 365–370. doi: 10.1016/j.sbspro.2014.08.274
- Gao, W. (2013). "Private dispute resolution in online transactions: Types and characteristics", "Politics and law forum". *Pol. Law Forum* vol. 3.
- Gong, Y. (2012). The reform of the working procedures and methods of the international court of justice: status quo and prospects. *China Foreign Affairs Rev. (J. China Foreign Affairs Univ)* 02), 150–158.
- Gu, Z. (2013). Research on the status quo and development trend of legal diplomacy in China. *Modern Law Sci.* 04), 173–180.
- Hayton, B. (2018). The modern creation of china's 'Historic rights' claim in the south China Sea. *Asian Affairs* 49 (3), 370–382. doi: 10.1080/03068374.2018.1487689
- Herbert, E. B. (2021). The role of the international court of justice in actualising global peace. *Indian J. Int. Law* 59, 323–354. doi: 10.1007/s40901-020-00121-0
- Huang, Y., Chen, L., Chen, P., Negenborn, R. R., and van Gelder, P. H. A. J. M. (2020). Ship collision avoidance methods : State-of-the-art. *Saf. Sci.* 121 (April 2019), 451–473. doi: 10.1016/j.ssci.2019.09.018
- Huang, Y., and Gelder, P.H.A.J. (2020). Collision risk measure for triggering evasive actions of maritime autonomous surface ships. *Saf. Sci.* 127 (October 2019), 104708. doi: 10.1016/j.ssci.2020.104708
- Hu, Y., Zhang, A., Tian, W., Zhang, J., and Hou, Z. (2020). Multi-ship collision avoidance decision-making based on collision risk index. *J. Mar. Sci. Eng.* 8 (9), 1–25. doi: 10.3390/JMSE8090640
- IMO (1972). Conventions on the international regulations for preventing collision at Sea (COLREGS). *Int. Maritime Organ. (IMO)*. Available at: <https://www.imo.org/en/OurWork/Safety/Pages/Preventing-Collisions.aspx#:~:text=One%20of%20the%20most%20important,or%20near%20traffic%20separation%20schemes>.
- Jandhyala, S. (2020). "The politics of investor-state dispute settlement: How strategic firms evaluate investment arbitration," in *Handbook of international investment law and policy*. Eds. J. Chaisse, L. Choukroune and S. Jusoh (Singapore: Springer Nature), 1–18. doi: 10.1007/978-981-13-5744-2_72-1
- Kadrimi, L. (2020). The right of navigation and development in the Albanian reality. *Interdiscip. J. Res. Dev.* 7 (1), 55.
- Kim, S.-M., Haug, S., and Rimmer, S. H. (2018). Minilateralism revisited: MIKTA as slender diplomacy in a multiplex world. *Global Governance: A Rev. Multilateralism Int. Org* 24 (4), 475–489. doi: 10.1163/19426720-02404001
- Koh, L., Dolgui, A., and Sarkis, J. (2020). Blockchain in transport and logistics – paradigms and transitions. *Int. J. Prod Res.* ISSN 58 (7), 2054–2060. doi: 10.1080/00207543.2020.1736428
- Lehto, M. (2020). Cyber security in aviation, maritime and automotive. *In Comput. Big Data Transp* (Cham) 45, 19–32. doi: 10.1007/978-3-030-37752-6_2
- Logina, A. (2009). *The international law related to maritime security: An analysis of its effectiveness in combating piracy and armed robbery against ships* (Sweden: World Maritime University).
- Los Convention (1982) *United Nations convention on the law of the sea. united nations*. Available at: https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf.
- Mahbub, N. T. (2020). The role of proportionality in the law of transboundary waters. *Rev. European Comp. Int. Environ. Law* 29 (2), 349–360. doi: 10.1111/reel.12381
- Mao, Y., and Gan, J. (2012). "China's public diplomacy and means innovation in the field of climate", "International forum". *J. Int.Forum* 1.
- Messineo, F. (2019). "The functions of the international court of justice: Tending to the law while settling disputes?," in *The future of international courts, 1st ed.* Eds.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

- A. Kent, N. Skoutaris and J. Trinidad (London, United Kingdom: Taylor & Francis Group), 14. doi: 10.4324/9780429463280
- Mo, S. (2013). "On the theory and practice of china's public diplomacy", "Diplomatic review (Journal of China foreign affairs university)". *Diplomatic Rev.: J. China Foreign Affairs University* 4.
- Najaf, R., and Najaf, K. (2021). Political ties and corporate performance: why efficiency matters? *J. Business Socio-Econ Dev.* 1 (2), 2635–1374. doi: 10.1108/JBSED-03-2021-0023
- Nikolai, M., Corradi, P., Lavender, K., Garaba, E. V. S. S. P., Lampitt, R. S., and Galgani, F. (2019). Toward the integrated marine debris observing system. *Front. Mar. Sci.* 6. doi: 10.3389/fmars.2019.00447
- Novikova, K., Khan, M. I., and Chang, Y. (2022). Russian Laws governing marine insurance and the development of mutual insurance. *Res. Transp Business Manage.* 45, 100781. doi: 10.1016/j.rtbm.2022.100781
- People's Daily. (2015a). China's construction on Nansha Islands is to better fulfill relevant international responsibilities and obligations. *People's Daily*, 2015-05-27(021).
- People's Daily. (2015b). Improve understanding and mutual trust, avoid misjudgment and misunderstanding. *People's Daily*, 2015-04-14(023).
- The "Rules of encounters at sea" should not be misinterpreted. Available at: <http://news.163.com/14/0425/02/9QL2S2j400014AED.html>.
- Peters, A. (2017). The refinement of international law: From fragmentation to regime interaction and politicisation. *Int. J. Const Law* 15 (3), 671–704. doi: 10.1093/icon/mox056
- Rochwulaningsih, Y., Sulistiyono, S. T., Masruroh, N. N., and Maulany, N. N. (2019). Marine policy basis of Indonesia as a maritime state: The importance of integrated economy. *Mar. Policy* 108 (July), 103602. doi: 10.1016/j.marpol.2019.103602
- Song, G. (2014). China's neighboring economic diplomacy: Mechanism coordination and strategic choice. *Stud. Int. Issues* 02), 41–52.
- Suardi, A., and Fakhrolloh, Z. A. (2022). "Regulation and law enforcement aspects of maritime security," in *Proceedings of the First Multidiscipline International Conference [Jakarta, Indonesia: European Alliance for Innovation (EAI)]*. doi: 10.4108/eai.30-10-2021.2315676
- Tang, Z., and Si, Y. (2013). On china's maritime law system and its construction. *China Maritime Law Stud.* 03), 6–13.
- Teubner, G. (2012). *Constitutional fragments: Societal constitutionalism and globalisation* (Oxford, United Kingdom: Oxford Academic), 152–153. doi: 10.1093/acprof:oso/9780199644674.001.0001
- Thomas, S. D., and Kirk, V. P. (2011). Stop signals provide cross inhibition in collective decision-making by honeybee swarms. *Science* 335 (6064), 108–110. doi: 10.1126/science.1210361
- Ton, A. D. (2017). Code for unplanned encounters at sea and its practical limitations in the east and south China seas. *Aust. J. Maritime Ocean Affairs* 9 (4), 227–239. doi: 10.1080/18366503.2017.1326075
- Treves, T. (2007). *Fragmentation of international law: The judicial perspective* (Milano MI, Italy: Comunicazioni e Studi), 821–875.
- UNCLOS (1998) *The united nations convention on the law of the sea. UN-oceans and law of Sea*. Available at: http://www.un.org/Depts/los/convention_agreements/convention_historical_perspective.html.
- US Department of Defense (2014) *Secretary rumsfeld briefs on EP-3 collision—annual report to congress: Military and security developments involving the people's republic of china. US department of defense*. Available at: <http://www.defense.gov/Transcripts/Transcript.aspx?TranscriptID=1066>.
- Valencia, M., and Akimoto, K. (2006). Guidelines for navigation and overflight in the exclusive economic zone. *Mar. Policy* 30 (6), 704–711. doi: 10.1016/j.marpol.2005.11.002
- van Fossen, A. (2016). Flags of convenience and global capitalism. *Int. Crit. Thought* 6 (3), 359–377. doi: 10.1080/21598282.2016.1198001
- Walsh, R. S., Hitchcock, M. A., and Andersen, S. J. (2017). *The commander's handbook on the law of naval operations* (Monterey, California: Navy Warfare Library publications).
- Wang, M. (2011). The spatial diffusion and regional differences of Internet technology in China—Based on exploratory spatial data analysis. *Nanjing Soc. Sci.* 10), 22–29.
- Wang, F. (2014). Reflection on some basic issues of Internet information governance in China. *Zhongzhou Acad. J.* 09), 169–173.
- Wang, S., and Wang, S. (2011). Several theoretical issues on the party's absolute leadership over the army. *Polit. Sci. Stud.* 02), 11–18.
- Wang, J., and Wen, Z. (2012). The experience and enlightenment of the American industrial innovation alliance—Based on the case study of American microelectronics and computer technology corporation. *Sci. Technol. Manage. Res.* 32 (22), 1–5.
- Wulan, M. (2012). Thoughts on the localisation strategy of foreign economic enterprises' transnational operations. *Int. Econ Coop* 11), 4–8.
- Wu, B., Yan, X., Wang, Y., and Soares, G. (2017). An evidential reasoning-based CREAM to human reliability analysis in maritime accident process. *Risk Anal. an Int. J.* 37 (10), 1936–1957. doi: 10.1111/risa.12757
- Xu, J. (2014). Trial operation of unmanned fully automated terminal system. *Xiamen Daily*. pp. A0.
- Yackee, J. (2019). Investor-state dispute settlement at the dawn of international investment law: France, Mauritania, and the nationalization of the MIFERMA iron ore operations. *Am. J. Legal Hist* 59 (1), 71–110. doi: 10.1093/ajlh/njy028
- Yang, C., and Zhang, Q. (2021). "Claims and defenses to the nansha islands by Vietnam, the Philippines, Malaysia and Brunei," in *Legal study on China's sovereignty over the nansha islands* (Singapore: Springer), 121–135. doi: 10.1007/978-981-15-8715-3_5
- Yau, K. L. A., Peng, S., Qadir, J., Low, Y. C., and Ling, M. H. (2020). Towards smart port infrastructures: Enhancing port activities using information and communications technology. *IEEE Access* 8 (c), 83387–83404. doi: 10.1109/ACCESS.2020.2990961
- Ye, Q. (2000). The cradle of capitalist civil and commercial law—Medieval city law, commercial law and maritime law in Western Europe. *J. Renmin Univ. China* 01), 75–82.
- Yıldırım, U., Başar, E., and Uğurlu, Ö. (2019). Assessment of collisions and grounding accidents with human factors analysis and classification system (HFACS) and statistical methods. *Saf. Sci.* 119, 412–425. doi: 10.1016/j.ssci.2017.09.022
- Yunbi, Z. (2015a) *An interview on china's construction activities on the nansha islands and reefs. China daily*. Available at: https://www.chinadaily.com.cn/china/2015-05/27/content_20827354.html.
- Yunbi, Z. (2015b) *Nansha islands construction "befits china's international responsibilities."* *China daily*. Available at: https://www.chinadaily.com.cn/china/2015-05/27/content_20827819.html.
- Zampella, P. (2019) *Maritime and air law facing unmanned vehicle technology. UNICA IRIS institutional research information system*. Available at: <https://iris.unica.it/handle/11584/260800>.
- Zhang, F. (2013). An analysis of important factors in the formation of military diplomacy style: Taking china's military diplomacy as an example. *Int. Observ* 03), 35–41.
- Zhang, S., Chen, J., Wan, Z., Yu, M., Shu, Y., Tan, Z., et al. (2021). Challenges and countermeasures for international ship waste management: IMO, China, united states, and EU. *Ocean Coast. Manage.* 213, 105836. doi: 10.1016/j.ocecoaman.2021.105836
- Zhang, X., and Zheng, L. (2010). On the deviation of "flag state centralism" in international maritime jurisdiction. *Legal Rev.* 06), 69–76.
- Zhao, K. (2012). Constructive leadership and the transformation of china's diplomacy. *World Econ Polit* 05), 42–57.
- Zhao, K. (2013). "Non-traditional diplomacy: Socialisation of diplomacy and its consequences", "World economy and politics". *World Economy and Politics* 2.
- Zheng, Y. (2012). On the relationship and transformation of customary law and soft law. *J. Shandong Univ. (Philos Soc. Sci. Ed)* 02), 94–100.
- Zheng, Q. (2016). Research on auxiliary decision-making for intelligent collision avoidance of multi-target ship at sea. *Ship Sci. Technol.* 16), 94–96.