Engineering Advances, 2022, 2(2), 191-193
https://www.hillpublisher.com/journals/ea/
ISSN Online: 2768-7961

Application Status of Automatic Identification System (AIS) in Chinese Fishing Vessels

Xin Hu

Fishery Machinery and Instrument Research Institute, Chinese Academy of Fishery Sciences, Shanghai 20092, China.

How to cite this paper: Xin Hu. (2022) Application Status of Automatic Identification System (AIS) in Chinese Fishing Vessels. *Engineering Advances*, 2(2), 191-193.
DOI: 10.26855/ea.2022.12.009

Received: November 20, 2022
Accepted: December 18, 2022
Published: December 30, 2022

***Corresponding author:** Xin Hu, Fishery Machinery and Instrument Research Institute, Chinese Academy of Fishery Sciences, Shanghai 20092, China.

Abstract

China is a big fishing country with 560,000 fishing boats. AIS is the core equipment for communication and navigation. In order to ensure the safety of navigation, Chinese fishing boats are equipped with a large number of AIS equipment. AIS equipment not only provides technical services for fishing vessels and fishery administration management, but also provides a basis for the handling of fishing vessel collision accidents. With the widespread use of AIS in fishing vessels, it has effectively prevented a large number of fishing vessel collision accidents and played a role in ensuring safe navigation. However, with the increase in the popularity of AIS in fishing vessels, more and more problems have been exposed. This paper expounds the development history of the application of AIS in Chinese fishing vessels, studies the technical characteristics and principles of AIS in fishing vessels, analyzes the role of AIS in fishing vessels, summarizes the problems existing in the use of AIS, and puts forward corresponding suggestions.

Keywords

Fishing, Ship, AIS, Technical characteristic

1. Foreword

Water traffic safety is an important part of safety production. Fishing boats are an important participant in water transportation. China is a big fishing country with 560,000 fishing boats [1]. With China's continuous emphasis on water safety production, during the "13th Five-Year Plan" period, compared with the "12th Five-Year Plan" period, the number of water traffic accidents and the number of deaths and missing persons dropped by 34.4% and 25.5% respectively. However, the number of collisions increased by 21.6%, and the number of collisions between fishing boats and transportation vessels accounted for 8.5% of the total number of water traffic accidents from 8.2% [2]. The compatibility of communication and navigation equipment between fishing boats and merchant ships is one of the reasons for the collision of fishermen. As the core equipment in ship communication and navigation, AIS plays a key role in navigation safety. The safety risks of commercial fishing vessels are mainly concentrated in the overlapping and overlapping of traditional fishing grounds and customary shipping routes in my country, some key fishing grounds and key ports and shipping route waters are seriously overlapping, and some fishing vessels occupy shipping routes to engage in aquaculture production, and commercial vessels stray into fishery production areas. However, with the widespread use of AIS, more and more problems have been exposed, including the technical difficulties of AIS itself, and the needs of users and management departments for AIS functions. Faced with these problems, AIS manufacturers are also Active improvement, further updates and additions have been made to the functions of AIS, in order to meet the needs of users. However, with the emergence of various AIS, how to choose has become a difficult problem, especially the AIS installed on fishing boats, additionally need to consider the quality and economic affordability of the fishermen themselves.

2. Development of AIS Regulations and Standards for Chinese Fishing Vessels

The full name of AIS is Automatic Identification System. Ships equipped with AIS system can automatically broadcast the dynamic information, static information and other navigation information of the ship to other AIS system ships and shore stations. Ships equipped with AIS system can automatically receive other AIS system ships and shore stations' information at the same time. And ships equipped with AIS system can respond differently according to specific instructions issued by the management authority. The purpose of the ship equipped with AIS is to improve the cognition ability of collision avoidance situation and collision risk, and to issue an alarm when the ship is in an emergency, so as to improve the rescue efficiency. The AIS system can also be used to supervise ships and analyze the causes of water traffic accidents.

In order to strengthen the management of coastal navigation safety and improve the order of coastal navigation, the Maritime Safety Administration of the People's Republic of China issued the "Notice on the Installation of Onboard Automatic Identification System on Some Coastal Navigation Vessels" on October 20, 2005 [3]. In 2006, according to IMO MSC 76 (69) and ITU-R M.1371, the Chinese standard for AIS system was formulated: GB/T 20068 "Technical Requirements for Shipborne Automatic Identification System (AIS)" [4]. In 2011, the Ministry of Agriculture and Rural Affairs of China issued the aquatic product standard SC/T 8145 "Technical Requirements for Type B Shipborne Equipment of Automatic Identification System for Fishing Vessels", which made specific technical requirements for Type B AIS equipment of fishing vessels. In 2017, China released GB/T 35552 "Technical Requirements for Ship Automatic Identification System (AIS) Class B Equipment", which made specific technical requirements for Class B AIS equipment for ships. According to China's "Technical Regulations for Statutory Inspection of Sea-going Vessels on Domestic Voyages" (2020), all passenger ships and cargo ships of 500 gross tonnage and above in China shall be equipped with a Class A AIS equipment as required. Equipped with a Class A or Class B AIS device as required. According to China's "Technical Regulations for Statutory Inspection of Domestic Marine Fishing Vessels" (2019), fishing vessels with a length of 12 meters and above should be equipped with an AIS system.

In the process of supervising fishing boats, the Chinese fishery supervision department found that fishermen deliberately cut off and shut down the AIS equipment, wrote data without authorization, tampered with and destroyed data, etc., which caused serious safety hazards to fishery safety production. The occurrence of violations proposes the "Plug-in Fishing Vessel Automatic Identification System (AIS)", and China will release the "Technical Specification for Fishing Vessel Automatic Identification System (AIS) Class B Equipment" in 2021 [5].

3. Fishing Boat AIS Working Principle

AIS shipborne equipment are divided into Class A and Class B. Class A uses the SOTDMA protocol. Class B uses the CSTDMA protocol. In the early days of the introduction of the AIS system in China, the AIS shore station network only supported the Class A. In 2008, China upgraded the AIS shore station and completed the compatibility with all Class B [6]. Because Class A are expensive for fishermen and the fishing industry does not require Class A onboard. So the main installations of Chinese fishing boats are Class B onboard. When an AIS device using the CSTDMA protocol sends a message, it does not broadcast the message immediately after the time slot arrives, but determines an idle time slot by listening to the existing communication situation. When it is detected that a certain time slot is not used, the AIS device occupies this time slot to transmit. Compared with commercial ship AIS, the content of location information and static information sent by fishing vessel AIS equipment is relatively simple. Some old merchant ship AIS equipment whose software has not been updated in time cannot identify the fishing boat AIS equipment, resulting in poor communication. Fishing boat AIS equipment is only allowed to transmit safety-related text messages, the length of the transmitted message cannot exceed one time slot, and automatic reply cannot be performed.

4. The role of AIS in Chinese fishery production

AIS can provide navigation services for fishing boats, and in special cases, emergency alarms can be made on public channels. When a fishing vessel encounters an emergency, it can issue an emergency alarm, and all vessels within 20 nautical miles of it can receive the distress message. In order to ensure the time to go to the rescue in time, it can effectively curb the occurrence of major accidents. AIS can serve fishery administration and is beneficial to the supervision and management of fishery production. The AIS system can provide the fishery administration department with dynamic and static information on the position of fishing vessels, so that it can monitor the vessel's position information in real time, and can automatically record the vessel's navigation process and dynamic changes within the monitoring range. Fast playback is traffic information with strong geospatial and temporal and spatial characteristics. AIS can provide a basis for the handling of fishing vessel collision accidents. Since the monitoring platform of the automatic ship identification system has a fast playback function, it can extract and playback the dynamic data of the ship at the time of the accident, and the responsibility for the accident can be clearly determined, which provides a legal basis for the determination of the responsibility for the collision accident between fishing boats and commercial ships.

5. Problems Existing in AIS in Fishery Production

5.1 Problems

The AIS system has high technological content and requires highly specialized technical personnel for operation management. The staff of the fishery radio management department at all levels are generally part-time, and some managers are mainly busy with other affairs in their daily work, and have no in-depth understanding of the problems existing in the communication work. Fishermen use the net level meter AIS in large quantities for fishery production, which seriously affects the use of the AIS system. In China, the network device can be easily purchased from online or offline stores [7]. The network position meter is easy to purchase, can be named arbitrarily, has high transmission power and high layout density, and is indistinguishable from ordinary ships on the ordinary AIS slipway and shore platform, which brings a lot of interference to the normal navigation and operation of ships and maritime supervision. It increases the risk of collision between commercial ships and fishing vessels, increases the pressure on AIS channel communication, and increases the pressure on supervision and search and rescue.

5.2 Suggestion

Strengthen the team of management talents in various fishery departments, and improve the work ability and comprehensive quality of grass-roots management personnel. Understand the various needs of fishermen and improve the quality of management personnel. Solve problems in fishery radio management. The use of AIS is more complicated, and fishermen's ability to learn and accept is not high. The display of AIS information is not intuitive enough, so the related functions of AIS of fishing boats are improved, and the system is optimized to simplify the operation. Aiming at the problem of AIS flooding of network location meters, the production and sales supervision of network location meters should be strengthened, and the technical specifications of network location meters should be standardized from the source. At the same time, it is also necessary to upgrade the existing network level meter and AIS system, and increase the analysis and identification function of the network level meter to avoid the confusion between the network level meter icon and the ordinary AIS icon.

6. Conclusion

It has been less than 20 years since AIS was first applied to Chinese fishing vessels. It has effectively prevented a large number of fishing vessel collision accidents, played a role in ensuring safe navigation, improved fishery production efficiency, and played a role in promoting fishery development. This paper summarizes the history of the application and development of AIS equipment in Chinese fishing boats, expounds the working principle of AIS equipment for fishing boats and its important role in fishery production, analyzes the causes of problems in the use of AIS equipment, and proposes corresponding solutions.

References

[1] China Fishery Statistical Yearbook 2021 [M]. Beijing: China Agricultural Press, 2021.

[2] Interpretation: Deepening the Joint Governance of Commercial Fisheries and Fisheries, Resolutely Curbing Major Commercial and Fishing Vessel Collision Accidents, Yang Xinzhai, Deputy Director of the Maritime Safety Administration of the Ministry of Transport, talks about the special action of "Commercial and Fishery Co-governance 2022" [J]. China Maritime Affairs, 2022(6):57-58.

[3] Zhang Jian. Requirements for Shipment and Inspection of Ship Automatic Identification System (AIS) [J]. Shanghai Shipbuilding. 2006(2):30-32, 43.

[4] GB/T 20068-2006, Technical requirements for shipboard automatic identification system (AIS) [S].

[5] Ministry of Agriculture and Rural Affairs of the People's Republic of China. Notice of the General Office of the Ministry of Agriculture and Rural Affairs on Accelerating the Pilot Work of "Plug-in AIS" for Fishing Vessels [OB/EL]. http://www.moa.gov.cn/nybgb/2021/202107/ 202111/t20211103_6381196.htm.

[6] Hu Bo hua. Discussion on the application of AIS on fishing vessels [J]. China Water Transport, 2012, 13(6):60-61, 63.

[7] Li Yongpan. The current situation, problems and countermeasures of the use of fishery net level meters in my country [J]. World Shipping. 2021, 44(21): 13-16.