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Collision Avoidance Maneuvers for Vessels Navigating through Traffic Separation Scheme

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Abstract : Ship collision is one of the major concerns while navigating in the ocean. In congested sea routes where there are hectic offshore operations, ships are often forced to take close encounter maneuvers. Maritime rules for preventing collision at sea are defined in the International Regulations for Preventing Collision at Sea. Traffic Separation Schemes (TSS) are traffic management route systems ruled by International Maritime Organization (IMO), where the traffic lanes indicate the general direction of traffic flow. The Rule 10 of International Regulations for Preventing Collision at Sea prescribes the conduct of vessels while navigating through TSS. But no quantitative criteria regarding the procedures to detect and evaluate collision risk is specified in International Regulations for Preventing Collision at Sea. Most of the accidents that occur are due to operational errors affected by human factors such as lack of experience and loss of situational awareness. In open waters, the traffic density is less when compared to that in TSS, and hence the vessels can be operated in autopilot mode. A collision avoidance method that uses the possible obstacle trajectories in advance to predict “collision occurrence” and can generate suitable maneuvers for collision avoidance is presented in this paper. The suitable course and propulsion changes that can be used in a TSS considering International Regulations for Preventing Collision at Sea are found out for various obstacle scenarios.

Keywords : collision avoidance, maneuvers, obstacle trajectories, traffic separation scheme
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