

整合風浪模式建立船舶航行監控預警系統

Development of the monitoring and warning systems for ship navigation considering wind and wave simulation

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摘要

臺灣地理位置位於東北亞和東南亞交界處，往北連結日本、韓國，往南連接東南亞等各國，不僅是東北亞與東南亞海上來往航運的樞紐，在海運與經濟貿易上更為重要之熱點。然而我國位處之地理位置卻易受颱風或異常波浪侵襲，西北太平洋地區每年平均生成 26.7 個颱風，其中平均 3.6 個颱風對臺灣本島造成重大影響，颱風所引起的巨浪除對港灣設施造成破壞，亦困擾船舶航行與碇靠之管理。有鑑於此，本計畫發展臺灣周邊海域的風浪預警介面，研發能快速計算颱風時期臺灣周邊海域颱風波浪的自動化整合生成模組，並利用現有的 AIS 系統配合風浪預測資料進行告警系統範圍的劃設，並即時提供危險範圍內的船舶資訊供管理單位做參考。

此外延續交通部運研所近年來在 AIS 系統與資料庫的相關研究，持續發展船舶航行安全風險評估系統，首先透過轉移港研中心往昔 AIS 資料至更適合處理巨量數據的文檔式 NoSQL 資料庫，以提升 AIS 資料庫的擴充性與效能。並以此資料庫做為大數據資料源配合人工智慧技術建立船舶航跡預測模型，再透過統計分析界定船舶行為異常、位置異常等情況的告警原則，以布袋港為示範港建立智慧化船舶航行安全風險評估系統，期能降低海上災難發生機率，有效提升船舶於海上航行與港口定泊停靠之安全。

關鍵詞：自動識別系統、波浪預測、資料庫、人工智慧、預測系統

Abstract

Taiwan is located at the intersection between the geographical subregions of North-East Asia and South-East Asia to have a key junction of ship navigation between both subregions and to be a hot spot of sea transportation and economics and trade. However, the waters around Taiwan are suffering huge waves during typhoon periods. Averaged 3.6 typhoons per year pass through or by Taiwan from an average of 26.7 typhoons occurring in the region of the west Pacific Ocean and. Those typhoons cause strong winds and large waves to have severe impacts on sea transportation in the waters. Based on the demand for safe sea transportation during typhoon periods, monitoring and warning systems for ship navigation

are required to be developed considering fast wind and wave simulation associated with AIS.

Following the recent researches for AIS and its related data base supported by the Center of Harbor & Marine Technology this project is to develop a new warning system for safe ship navigation. The key works are: 1. Converting the original data of AIS stored at the Center of Harbor & Marine Technology to a format for a NoSQL data base that can be easily used for the treatment of big data for data augmentability and efficiency; 2 Applying artificial intelligence techniques to simulating ship tracks and to determining the criteria of abnormal sailing behaviors and stranding positions. The warning system is established and examined for the Budai Port as an example.

Keywords : automatic identification system, wave prediction, database, artificial intelligence, warning system.