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Title: Construction of a Preliminary Simulation System for Real-Time Prediction of Ship Ballasting Process

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Abstract: Ships use the ballast system to maintain stability. The ballast system greatly influences loading capacity and navigation of a ship as well as the ocean environment. Therefore, it is necessary to select an adequate ballast system not only to increase the efficiency of ship operation but also to protect the ocean from undesirable results of current ballasting process. The ship ballast system can be optimized by performance during the period of ship design and production. Until now most shipbuilders have implemented a ballast system based on similar data from previously built ships or experts' knowledge. If previous ballast data is unavailable, however, it is necessary to determine the most appropriate ballast system by trial-and-error. To have efficient ship design and production process, this time-consuming and expensive bottleneck should be avoided. In this paper, a ballast simulation system that predicts the ballasting and deballasting processes using a computer model is introduced. The amount of fluid flowing through a ballast system is analyzed considering friction losses in pipe's inner walls, junctions, and valves. The developed system uses the graphic user interface approach for convenient interaction between the user and the system. The results of real-time simulation will help the user to foretell the ballasting process with efficiency and accuracy.

Keywords: Ballast, simulation, graphic user interface