

REVERSE ENGINEERING OF SHIP HULLS BASED ON PHOTOGRAMMETRIC MEASUREMENTS AND VAGUE DISCRETE INTERVAL MODELING

Herbert J. KOELMAN(1), Imre HORVÁTH(2) and Zoltán RUSÁK(2)

(1) Scheepsbouwkundig Advies en Reken Centrum (SARC), Bussum, The Netherlands, Herbert@sarc.nl

(2) Section of Computer Aided Design and Engineering, Faculty of Design, Engineering and Production, Delft University of Technology, The Netherlands, i.horvath@io.tudelft.nl, z.rusak@io.tudelft.nl

ABSTRACT

Reverse engineering of ship hulls is requested by, among other things, the lack of old manufacturing documentation, the need to develop CAD models based on handcrafted physical models, or the wish to conceptualize a new ship hull by reusing the global shape or local shape features of existing designs. Due to the typical large sizes, probe-based direct measuring or digital scanning of ship hulls is clumsy or not cost-effective. In our research, we applied multi-camera-based photogrammetric measurements to generate the input point sets for reverse engineering of vessels or models of vessel. Based on this input vague discrete shape models are generated. The vague model is able to represent the uncertainties or incompleteness of measurements in a single interval model. It also allows a ruled-based instantiation of the component shapes. The offered volumetric and mathematical operators are used for a purposeful manipulation of the vague and nominal shapes of the ship hull. The paper explains the process of deriving a vague model of a ship hull from photogrammetric-measured data as well as of rule-based instantiating and geometric manipulation. The models of instance shapes of the ship hull can be exported to commercial and proprietary CAD/CAE systems.