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Fundamental Study for Automatic Ship Hull Form Fairing

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Summary: The ship hull form fairing is one of costly tasks in ship hull design stage. Because the fairing task operators must be trained for a long time to acquire the skills and it is done with manual procedure even though the 3D CAD system is implemented. The present study investigates an automatic fairing method for ship hull surface which is created with the combined Coons patch. In past researches concerned with the automatic surface fairing technique, the fairing is carried out by minimizing the unfairness function of the surface with optimization method. The unfairness function is usually defined by using physical property of surface such as strain energy or by using geometrical property represented by surface curvature. However, it would appear that minimizing the strain energy of the surface sometimes changes the hull form characteristics which should be maintained. On the other hand, most of existing unfairness functions based on surface geometrical property are defined for the surface which have continuous curvature in whole area and are not applicable for the combined Coons patch surface which we use for hull surface creation, because Coons patch surface do not have continuous curvature on the boundary of the patches. Therefore the present study defines several unfairness functions with geometrical property of the surface which can be applicable to combined Coons patch surface and minimize it to obtain a faired hull surface. The present method is applied to the fairing at aft part of tanker type ship. The obtained hull surface after the fairing is smoothed compared with before the fairing and it is considered that the rough fairing is carried out successfully through the present method.

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