

ABSTRACT

Structural Analysis of Rigid Wing Sail on a Low Fuel Consumption Ferry Using Finite Element Method

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This final project is subjected to make a sail's structure as a development from the research has done by Aldomoro F. B. Sitorus titled "*STUDI PERANCANGAN FERRY HEMAT BAHAN BAKAR UNTUK WILAYAH MALUKU*" on 2011, establish sail type and dimensions use on the ship considered. The type of sail will be structurally analyzed is a *Rigid Wing Sail NACA 0012*, having form of rectangle which the dimensions are, chord length 7.8 m, height 11.68 m, aspect ratio 1.5. in this analysis, initial design given from an analytical calculation. To get an optimum structure of strength and weight, proposed 5 construct variation of profile dimensions and plate thickness. These five variations were analyzed using Finite Element Method (FEM) helped by a Software, Nastran. Loading of sail is a maximum wind force from direction perpendicular to the center line of sail. Von mises stress as an output from FEM has to be satisfy the allowance stress. The next is choosing the optimum structure. Variation with plate thickness of 4 mm and profile L 75x50x5 has a stress 129.38 MPa, below the allowable stress 156.67 MPa. This variation also have a minimum weight than the others, of 4.921 ton below the requirement 5.446 ton.

Keywords : *rigid wing sail, structure, airfoil, finite element method*