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Analytical formulation of plating ultimate strength with pitting corrosion wastage

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The assessment of plating ultimate strength with pitting corrosion wastage is a basic issue for the proper scantling and design of ship structures. In the past, several nonlinear FE analyses have been performed to investigate the incidence of pitting degree and corrosion depth on plating ultimate strength, with the main aim of providing some approximate formulations, useful at least in a preliminary project phase. Based on actual state of art, the main aim of current research is to provide an analytical solution for the ultimate strength of platings with random pitting corrosion wastage, by solving the Marguerre nonlinear governing differential equations for large deflection analysis of platings in the post-buckling regime. A comparative study with several well-known FE results available in literature is performed and a simplified formulation to assess the plating ultimate strength reduction, as a function of pitting degree and corrosion depth to gross thickness ratio, is proposed.

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