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Optimum design of stiffened plates for different loads and shapes of ribs

In this overview of loaded stiffened plates various plate types, loadings, and stiffener shapes are investigated. Mikami [1] and API [2] methods are used for the optimum design and comparison of the two methods and uniaxially compressed plates stiffened by ribs of various shapes. Both methods consider the effect of initial imperfection and residual welding stresses, but their empirical formulae are different. The elastic secondary deflection due to compression and lateral pressure is calculated using the Paik's solution [3] of the differential equation for orthotropic plates, and the self-weight is also taken into account. Besides this deflection some more deformations are caused by lateral pressure and the shrinkage of longitudinal welds. The unknowns are the thickness of the base plate as well as the dimensions and number of stiffeners. The cost function to be minimized includes two kinds of material and three kinds of welding costs.

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