

Comparison of Different Methods of Evaluating Nozzle Junction Stresses under External Loads

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Abstract : This paper addresses the junction stress analysis of orthogonally intersecting thin walled cylindrical shell and thin walled cylindrical nozzle subjected to external loading on nozzle. Junction stresses have been calculated theoretically by welding research council (WRC) bulletins 107 and 297 for different nozzle loads. WRC bulletins 107 and 297 have been used by design engineers for calculating nozzle-vessel junction stresses since their publication. They give simple empirical relations and easy in application. Also 3D FEA in which material is elastic has been done in ANSYS software with 8 node solid element model and results of FEA have been compared with WRC results. Stress intensities obtained by WRC 297 are generally slightly higher than obtained by WRC 107. Membrane stresses obtained by FEA are much higher than WRC and membrane plus bending stresses obtained by FEA are lower than WRC.

Keywords : FEA, junction stress, solid element, WRC 107, WRC 297

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