عنوان مقاله:

Thermo-elastic creep analysis and life assessment of rotating thick pressurized cylindrical shells using third-order shear deformation theory

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خلاصه مقاله:

In the present study, time-dependent thermo-elastic creep behavior and life assessment of rotating thick-walled cylindrical shells made of ۳۰۴L austenitic stainless steel (۳۰۴L SS) are investigated based on the third-order shear deformation theory (TSDT). Loading is composed of a uniform internal pressure, distributed temperature field, and a centrifugal body force due to rotating speed. Norton’s law is utilized as the material creep constitutive model. Using the minimum total potential energy principle, a system of differential equations in terms of displacement and boundary conditions are derived. Then, the governing equations are solved with an analytical approach, which leads to an accurate solution. Subsequently, an iterative procedure is also proposed to determine the stresses and deformations at different creep times. Larson-Miller Parameter (LMP) and Robinson's linear life fraction damage rule are employed for assessing the creep damages and the remaining life of cylindrical shells. To the best of the researcher’s knowledge, in the previous studies, there is no study carried out into third-order shear deformation theory for thermo-elastic creep analysis of cylinders. To validate the accuracy of the suggested method based on TSDT, a comparison among analytical results and those of the finite element method (FEM) is performed and very good agreement is .found. The results indicate that the present analysis is accurate and computationally efficient

کلمات کلیدی:

Creep, Life assessment, Rotating thick cylindrical shell, ۳۰۴L austenitic stainless steel, Third-order shear deformation theory