عنوان مقاله:

Thermo-Elastic and Time-Dependent Creep Evolution Behaviour of Ferritic Steel Rotating Disks using Theta Projection Concept

محل انتشار:

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خلاصه مقاله:

In this article, thermo-elastic and creep evolution behaviour of ferritic steel rotating disks with variable thickness are investigated. Four thickness profiles of uniform, convex, concave and linear are considered for the disk geometry. The material creep constitutive model is defined by the Θ projection concept, based on the experimental results existing in the literature. Loading applied is due to the inertial body force caused by the rotation and a constant temperature field throughout the disk. To achieve history of stresses and displacements, a numerical procedure using finite difference and Prandtl-Reuss relations is used. Stress and deformation histories are calculated using successive elastic solution method. In order to verify the solution approach, both composite and aluminum rotating disks were taken into account and the thermo-elastic and time-dependent creep behaviours for composite as well as the former for aluminum were obtained. Results from the current study were found to be in very good agreement with those available from literature in the area. It was shown that convex thickness profile disks display the least creep displacement, creep effective and circumferential stresses. Additionally, constant and concave thickness profiles were positively correlated with time while for linear and convex ones, it was found to have an inverse trend.

کلمات کلیدی:

Ferritic steel rotating disks, Stress and strain redistribution, Theta projection concept, Time-dependent creep, Variable thickness