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Thermomechanical Analysis of Hyperelastic Thick-Walled Cylindrical Pressure Vessels, Analytical Solutions and FEM

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Highlights

- Using deformation gradient decomposition, the thermomechanical analysis of a thick-walled cylindrical vessel is studied.
- Employing exp − exp strain energy, the stress distribution is presented both analytically and numerically.
- The radial and axial stresses are more sensitive to variation of the angular velocity than the hoop stress.
- The positive temperature gradient leads to tensile radial stress and compressive hoop and axial stress in the rotating cylinder.
- Increasing the angular velocity makes the cylinder more unstable, while the stability increases with $\lambda > 1$.
- Radial and hoop stresses are more sensitive to temperature change than the thermal axial stress.

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