TEST OF MATERIAL MODELS IN FEM ANALYSIS OF PRESSURE VESSELS (RATCHETING FAILURE MODE)

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Abstract. In this document, a small pressure vessel finite element model will be run in ANSYS software using different material models, and following ASME criteria. The ASME rules for construction of pressure vessels establish the common failure modes that must be verified by stress analysis. The typical failure modes to be verified are: plastic collapse, buckling, fatigue, ratcheting, vibrations, impact, crack growth, etc. One of these failure modes is ratcheting, defined as a progressive incremental inelastic deformation or strain which can occur in a component that is subjected to variations of mechanical stress, thermal stress, or both. In this case, the ASME code establishes two rules for verification by-analysis. This document will treat the issue of material models for ratcheting verification within ASME and using ANSYS software.