

Liu, M., Wang, Y.-Y., Advanced Modeling of Plasticity of Linepipe Steels with Anisotropic Texture and Complex Loading History, Proceedings of the 17th International Offshore and Polar Engineering Conference (ISOPE 2007), Lisbon, Portugal

Abstract

Modern linepipes can have highly anisotropic properties from manufacturing processes aimed at improving strength, toughness, and weldability. The anisotropy may have a significant effect on pipe integrity, including buckling and collapse resistance. Accurate material models are required to understand this effect. In this paper, Taylor's polycrystal plasticity model is introduced to study the anisotropy evolution during pipe forming and construction. The crystal plasticity model is physically realistic and the measured texture is used to model the anisotropy. The capability of the model in simulating material anisotropy and plasticity evolution under cyclic strains is demonstrated using an X100 material as an example.

Keywords

Linepipe integrity, Anisotropy, Taylor's crystal plasticity, Reel-lay