NUMERICAL ANALYSIS OF STRESS AND STRAIN FIELD IN GAS PIPELINES

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ABSTRACT

The paper presents the results of the investigation related to the bending and longitudinal welding stress and strain fields developed in gas pipelines. Pipe made of API-5L-X70 steel with diameter of 1422 mm and thickness of 20 mm has been used in the analytical and finite element analysis. Based on the moment's theory of thin cylindrical shells, both mechanical and thermal loads are taken into account in the numerical modelling. Loads introduced in the mathematical model come from crimping load of the initial plane plate which is used for the fabrication of longitudinal welding pipe and also from the thermal load developed by the welding process. The research is conducted by applying the finite elements method and the element birth and death technique to simulate the temperature field generated by each welding pass sequence, too. The results of this study could be useful in safety assessment of the natural gas pipelines in service.

KEYWORDS: gas pipelines, stress and strain field, thin shell, FEA.

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