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Effect of cyclic plastic deformation on microstructure and mechanical properties of weld metals used for reel-lay pipeline steels

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Abstract

Reel-lay process is an efficient and economic method for installing offshore pipelines. During reel-lay process, cyclic plastic deformation (CPD) is introduced into the pipeline and it will modify the mechanical properties of the pipeline steels. In this research, cyclic tension-compression plastic deformation was conducted on the weld metals of X60 pipeline to simulate the strain experienced in reel-lay process. Then the dislocation configurations and mechanical properties of the weld metals were investigated after CPD. The total dislocation density was increased by the CPD process. The dislocation configurations evolved from dislocation lines and tangles

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