

عنوان مقاله:

Numerical Analysis and Evaluation of Buried Pipeline Response to Strike-Slip Fault Motion

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خلاصه مقاله:

Buried pipelines often serve as lifelines in that they may carry resources that are essential to the support of human life (water and natural gas). When such pipelines cross active earthquake faults, there is potential for major damage to the pipeline and thus there is significant interest within the seismic design community in being able to accurately predict their response to such faulting. This study focuses on the numerical modeling of pipelines subjected to strike-slip faulting, local buckling of buried pipelines subjected to fault offsets and numerical simulation of lateral soil-pipe interaction. The numerical models are developed within a finite element analysis framework wherein simplified the complex three-dimensional (continuum) models, which can more accurately reflect the nature of soil-pipeline interaction, are utilized. The results are presented in diagram form, which depicts the critical fault displacement, and the corresponding critical strain versus the pipe diameter-to-thickness ratio. The numerical results showed the advantage of the proposed approach is that it can easily deal both with extensional and compressional deformation fields, and can be extended with no major difficulties both to normal and reverse faults. Furthermore, the proposed method can easily be extended to deal with inhomogeneous soil conditions, that may play an important role on the location of pipe damage. A potential further extension is the study of pipeline response to large landslide-induced .offsets, for which failure mechanisms similar to those studied in this work can be proposed

کلمات کلیدی:

buried pipeline; strike-slip faulting; seismic design; finite element simulations

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