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## Abstract

Seismic events pose one of the greatest dangers to pipeline systems. Pipelines may fail from the large displacements imposed at fault crossing and from liquefaction. Seismic wave could pose great threats to above ground facilities and perhaps lesser threats to buried pipelines. For buried pipelines safe and effective design against large displacements is one of the greatest challenges to pipeline designers. The tensile and compressive strains of buried pipelines resulted from large ground displacements are analyzed with finite element analysis. Seismic data of major active faults encountered in a planned pipeline project were used. The pipe was modeled with shell elements near the fault crossing and beam elements elsewhere. The fault was modeled with relative ground movement on either side of the fault. The pipe-soil interaction was modeled with soil-spring elements. The relationship of the maximum strain and the pipe-fault angle was investigated. The effects of material properties and pipe wall thickness on the integrity of the pipeline were examined.

**Keywords**

Strain-based design, Strain demands, Fault crossing, Seismic design, Finite element