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Abstract

Mine subsidence is one of the major ground movement hazards for buried pipelines in regions of completed and ongoing mining activities. The strain demand under mine subsidence is evaluated for candidate pipes to be used in the construction of large-diameter and high-pressure long distance pipelines in China. Two typical subsidence forms were discussed. 1. One form is the sag/trough subsidence with large subsidence depth and area but continuous boundaries. The pipeline remains in the soil after the subsidence. 2. The other form is the pit subsidence with small subsidence depth and area but more severe discontinuous boundaries. The pipeline may be suspended above the ground surface in the subsidence hole after the subsidence. For purposes of this research, the strain demand analysis was conducted with the commercial finite element analysis package ABAQUS®. The PIPE and ELBOW elements were selected to simulate the pipeline and the ASCE spring model was selected to determine the interaction between the pipeline and surrounding soil. The general consideration of the loads on pipeline in subsidence analysis is described. The results show that the pipeline experiences the most severe deformation during the discontinuous pit subsidence. The strain demands are compared with the pipe strain capacity in a companion paper to investigate the integrity of the pipeline.

Keywords

Strain Based Design, Ground Movement, Strain Demand