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Mechanical Behaviors and Failure Mechanisms of Buried Polyethylene Pipes Crossing Active Strike-slip Faults

Jie Zhang*, Yao Xiao, Zheng Liang

School of Mechatronic Engineering, Southwest Petroleum University, Chengdu, 610500, China

*Correspondence author: J. Zhang, E-mail: longmenshao@163.com

Abstract: Polyethylene (PE) pipes are widely used in gas transmission projects due to their excellent performances. Earthquake is destructive and difficult to predicted, which is one of the major disasters caused PE pipe failure. The study was conducted on the mechanical behaviors and failure mechanisms of buried PE pipes under fault movement, and the effects of gas pressure, fault dislocation, soil and pipe size on the mechanical behavior of PE pipes were discussed. The study indicates that gas pressure has a less effect on the mechanical behavior of PE pipe. Under faults, the flatness curve of PE pipe is distributed symmetrically with respect to the fault plane. Deformation rules of PE pipe in different stratum are similar, while the pipe deformation is the largest in clay and it is smallest in sand. The greater the standard pipe size, the greater the diameter flatness coefficient is. The larger the diameter, the smaller the pipe diameter flattening parameter is. PE pipes with a larger the standard dimension ratio of a fitting (*SDR*) and a smaller diameter are prone to failure in fault zone. The results can provide the basis for gas pipe design, laying, testing, and evaluation.

Key words: Polyethylene pipe; Strike-slip fault; numerical simulation; mechanical behavior; Failure analysis

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