

Determination of Safety Distance Around Gas Pipelines Using Numerical Methods

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Abstract : Energy transmission pipelines are one of the most vital parts of each country which several strict laws have been conducted to enhance the safety of these lines and their vicinity. One of these laws is the safety distance around high pressure gas pipelines. Safety distance refers to the minimum distance from the pipeline where people and equipment do not confront with serious damages. In the present study, safety distance around high pressure gas transmission pipelines were determined by using numerical methods. For this purpose, gas leakages from cracked pipeline and created jet fires were simulated as continuous ignition, three dimensional, unsteady and turbulent cases. Numerical simulations were based on finite volume method and turbulence of flow was considered using k- ω ; SST model. Also, the combustion of natural gas and air mixture was applied using the eddy dissipation method. The results show that, due to the high pressure difference between pipeline and environment, flow chocks in the cracked area and velocity of the exhausted gas reaches to sound speed. Also, analysis of the incident radiation results shows that safety distances around 42 inches high pressure natural gas pipeline based on 5 and 15 kW/m² criteria are 205 and 272 meters, respectively.

Keywords : gas pipelines, incident radiation, numerical simulation, safety distance

Conference Title : ICFMFA 2018 : International Conference on Fluid Mechanics and Flow Analysis

Conference Location : Dublin, Ireland

Conference Dates : February 15-16, 2018