

DEVELOPMENT OF AN ARTIFICIAL NEURAL NETWORK CORRELATION FOR PREDICTION OF PRESSURE DROP OF SLURRY TRANSPORT IN PIPELINES

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Abstract

In the literature, several correlations have been proposed for pressure drop prediction in slurry pipelines. However, these correlations fail to predict pressure drop over a wide range of conditions. Based on a databank of around 220 measurements collected from the open literature, a correlation for pressure drop was derived using a combination of Dimensional Analysis and artificial neural network (ANN) modeling. The pressure drop for slurry was found to be a function of four dimensionless groups: Reynolds number, Froude number, particle diameter/ pipe diameter, and solids volume fraction. Statistical analysis showed that the proposed correlation has an average absolute relative error (AARE) of 12.7% and a standard deviation of 16.4%. A comparison with selected correlations in the literature showed that the developed ANN correlation noticeably improved prediction of pressure drop. The developed correlation also shows better prediction over a wide range of operating conditions, physical properties, and pipe diameters, and it predicts properly the trend of the effect of the operating and design parameters on pressure drop.

Key Words : *Force analysis; Artificial neural network; Slurry pressure drop*