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Abstract Details

Title: Numerical estimatiation of pressure drop in horizontal and vertical slurry pipeline

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Abstract Transportation of solids with water as a carrier in the form of slurry through long length pipelines is widely used in many industries and power plants. In this perspective, numerical simulation of three-dimensional vertical slurry pipeline (VSPL) and horizontal slurry pipeline (HSPL) carrying glass beads solid particulate of spherical diameter 440 μm and density (ρ = 2470 kg/m^3) is carried out. The 3D computational model is developed for vertical and horizontal slurry pipeline of diameter 0.0549 m and analyzed in available commercial software Fluent using Eulerian two-phase model with RNG k-ε turbulence closure at different velocity range 1-2 ms^{-1}, and solid concentration range 10-20 % (by volume). It is found that the pressure drop increases for vertical and horizontal slurry pipeline with increase in flow velocity at all efflux concentration. The pressure drop in vertical slurry pipeline is found higher as compared to the pressure drop in horizontal slurry pipeline. The obtained results of predicted pressure drop in horizontal slurry pipeline are validated with the available experimental results in the literature. Finally, the results of solid concentration contour and pressure drop were also predicted in both the slurry pipelines.

Keywords: 3D Vertical and Horizontal slurry pipeline; Eulerian two-phase model; slurry concentration; velocity distribution; pressure drop