Characteristics of silica slurry flow in a spiral pipe

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Abstrak

Silica sand slurry is a multiphase flow that consists of liquid and particle solids. Slurry flow characteristics are affected by particle size, particle distribution, particle concentrate, pipe geometry, flow regime, and viscosity factors. Spiral pipe is one of the solutions to increase drag reduction at a certain velocity and Reynolds number (Re). The aim of this experiment is to figure out the influence of using spiral pipe in increasing drag reduction of silica sand slurry flow. The pipeline used is spiral pipe with a helicial tape with two ratios of pitch per diameter (p/D), i.e. = 4 and 7. The test loop is set up as 3,500 mm (3.5 meters) in length. The size of the particle is 1 mm in diameter. The mean density of the silica sand particles is 2,300 kg/m3. The velocities are set between 1m/second and 5m/second. The percentage of volumetric concentration of solids in slurry (Cw) varies between 20%, 30%, and 50% in weight. Particle concentration, the Reynolds number and ratio of pitch and diameter give significant impact to the drag reduction. At a ratio of pitch/diameter (p/Di) = 7, at a Reynolds number (Re) of 30,000 and at Cw 50% can increase drag reduction to about 33%.