

Documents

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Nucleation and accumulation phenomena of hydrate in oil and gas pipelines

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Abstract

The present study addresses the prediction of hydrate formation and deposition in oil and gas pipelines, which could consider as the main factor of pipe blockage. The process of hydrate formation and growth is dominated by two actions, the mass transfer and the reaction kinetics. The migration and deposition of hydrate are presented using the principle of deposition velocity, which in turn depends on the particle size, flow configuration and pipe roughness. The analysis shows that mass transfer dominates the growth of particle after nucleation occurred then the reaction kinetic leads the process when the size of the particle becomes relatively large. Experiments using saturated propane have been conducted and the photos taken after the tests have confirmed that different sizes of hydrates are observed. The motion and deposition of hydrates has been modeled using a new approach. The state of the art presented in this work is based on the fact that the influence of near wall region is significant and should be considered when the hydrate particle reaches the boundary layer region. Thus, the forces applied to the particle will direct the trajectory of the hydrate. Comparison of the proposed model with experimental results shows very good agreement in term of the distance between the location of particle nucleation and the deposition spot.

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