## **Evaluation of the Gas Hydrate Slurry Relative Viscosity Models**

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Gas hydrates are solid crystalline structures that contain small gas molecules such as methane, ethane, and carbon dioxide. These gas molecules (also known as guests) are trapped inside a three-dimensional hydrogen-bonded network of water cages. Since gas hydrates form at high pressure and low temperature, these solids can form and plug oil/gas flowlines. Traditionally, the oil/gas industry injects Thermodynamic Hydrate Inhibitors (THIs) to completely prevent the formation of gas hydrates in flowlines. However, this method is uneconomical, especially for maturing fields, and thus there is a paradigm shift in dealing with gas hydrates in flowlines. The current method for treating gas hydrates in flowlines is called "hydrate management," whereby gas hydrates are allowed to form, but their properties are controlled by injecting Low Dosage Hydrate Inhibitors (LDHIs). Using this method, advanced knowledge of the rheological properties of gas hydrate slurries is crucial for safe operation and transportation of gas hydrate particles in flowlines. Additionally, rheological properties of gas hydrates are also required for technological applications, such as gas separation, desalination, or sequestration. This paper will provide a review of the current relative viscosity models used by the industry, as well as other relative viscosity models available in the literature to predict the relative viscosity of gas hydrate slurries. The performance of each relative viscosity model is analyzed by comparing the relative viscosity prediction from models with 110 experimental data available in the literature. These experimental data were collected using various apparatuses and conducted over a wide range of experimental conditions (temperature, pressure, fluid properties, and shear rates). In this paper, the limitations of each relative viscosity model in predicting the relative viscosity of gas hydrate slurries will be identified and discussed. Finally, suggestions on improvements that can be made on the relative viscosity model of gas hydrate slurries will be presented.

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