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Verification and Application of Design Model for Settling Slurry Transport in Pipes*

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The application of most empirical correlations for hydraulic gradient of settling slurry are generally limited to the experimental region in which four different flow patterns can be observed: stationary bed flow, saltation flow, heterogeneous flow, and pseudo-homogeneous flow. Therefore, the reliable design model independent on not only the flow regimes but also pipe diameter is imperative for pipeline engineers.

By using the condition factor introduced by Sato et al., which represents the situation of solids movement in a pipe and calculated from the concentration profiles, an equation was derived for hydraulic gradient of settling slurry flow in horizontal circular pipes. With the slurry database, it was also assured that the equation was valid for practical pipeline design under the condition of settling slurry flow. Hence, the effect of pipe diameter and concentration on the Specific Energy Consumption and pipeline design procedure were discussed based on the analytical results.

Key Words : Settling Slurry, Slurry Transport, Hydraulic Gradient, Design Model, Verification with Database, Specific Energy Consumption.