

Modeling Of The Random Impingement Erosion Due To The Impact Of The Solid Particles

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Abstract : Solid particles could be found in many multiphase flows, including transport pipelines and pipe fittings. Such particles interact with the pipe material and cause erosion which threatens the integrity of the system. Therefore, predicting the erosion rate is an important factor in the design and the monitor of such systems. Mechanistic models can provide reliable predictions for many conditions while demanding only relatively low computational cost. Mechanistic models utilize a representative particle trajectory to predict the impact characteristics of the majority of the particle impacts that cause maximum erosion rate in the domain. The erosion caused by particle impacts is not only due to the direct impacts but also random impingements. In the present study, an alternative model has been introduced to describe the erosion due to random impingement of particles. The present model provides a realistic trend for erosion with changes in the particle size and particle Stokes number. The present model is examined against the experimental data and CFD simulation results and indicates better agreement with the data in comparison to the available models in the literature.

Keywords : erosion, mechanistic modeling, particles, multiphase flow, gas-liquid-solid

Conference Title : ICWM 2022 : International Conference on Wear of Materials

Conference Location : Prague, Czechia

Conference Dates : September 08-09, 2022