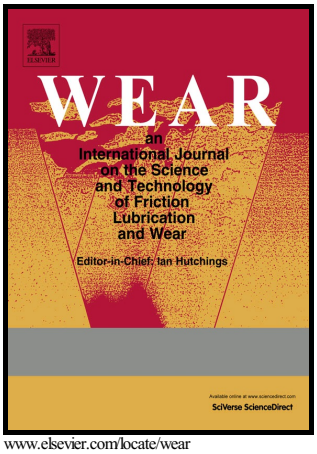
The effect of sub-models and parameterizations in the simulation of abrasive jet impingement tests

Gianandrea Vittorio Messa, Stefano Malavasi



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Gianandrea Vittorio Messa*, Stefano Malavasi

DICA, Politecinco di Milano, Piazza Leonardo da Vinci, 32 20133 Milano, Italy

Abstract

Since experimental erosion testing is rarely feasible in the engineering practice, the estimate of erosion is often performed by numerical simulations. Computational Fluid Dynamics (CFD) codes are often equipped with utilities for wear estimation which rely on a well-established methodology. However, besides requiring stringent assumptions, this methodology involves a number of sub-models and parameterizations which, being difficult to define a priori, are potential sources of uncertainty. The objective of this work is to investigate how the erosion estimates are affected by the different sub-models and parameters of a CFD-based wear prediction model, so that its actual predictive capacity may be established. We referred to the benchmark case of the abrasive jet impingement test which, despite being widely studied both experimentally and numerically, highlights all the issues of impact erosion modelling. A systematic activity of simulation of previous experiments revealed the key role played by some fluid-dynamics related quantities, such as the formulation of the particle equation of motion, besides the erosion model.

*Corresponding author

Email addresses: gianandreavittorio.messa@polimi.it (Gianandrea Vittorio Messa), stefano.malavasi@polimi.it (Stefano Malavasi)