

A NUMERICAL MODEL FOR 3D TRANSIENT EVAPORATION PROCESSES BASED ON THE VOLUME-OF-FLUID METHOD

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ABSTRACT A method for the computation of evaporating two-phase flow with *direction numerical simulation* is presented. The method is based on a *Volume-of-fluid* (VOF) implementation. The aim of the new-implemented method is to obtain more knowledge about the evaporation during the highly dynamical spray processes by the investigation of single droplets or small droplet groups. The focus of the present work is on the fluid mechanical implementation and validation. The computational model of the evaporation rate itself is only a very simple one for a single component, which can and must be adapted to experimental results by an empirical factor. The derivation of the governing equations and the numerical implementation are described in detail. The capability of the interface transport algorithm is presented. Additionally, for the validation of the new-implemented method a comparison with experimental data for heat and mass transfer is performed. In a first step the vapour distribution around a droplet is compared with laser-induced fluorescence (LIF) measurements of the vapour field behind a droplet. In a second step the Sherwood number for different Reynolds numbers is compared with experimental data. A good qualitative agreement for the vapour distribution between experiment and simulation is found. The accuracy of the predicted Sherwood number depends, however, strongly on the empirical factor.