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# Sharp interface models for two-phase flows: insights towards new approaches

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## Abstract

A detailed evaluation of two class of sharp methods for implementing interfacial forces is presented. These methods are implemented in a state-of-the-art numerical algorithm for two-phase flows. Each method has respective advantages and disadvantages; however, none of the existing sharp methods can be readily employed due to issues such as numerical instability or non-physicality. These issues and the reasons for their occurrence are comprehensively discussed through several test cases. Using the insights gained from this detailed evaluation, an alternative method for sharp implementation of interfacial forces is proposed. The proposed method is tested and validated for flows such as Rayleigh-Taylor instability and a falling droplet under gravity.

**Keywords:** Computational fluid dynamics, Sharp interfacial forces, Two-phase flow, Delta function, Stair-Step method, Areal method, Spurious velocities

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