Modeling the Initial Velocity of Two-Phase Jets  
Initiating a New Experimental Program for Model Verification

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ABSTRACT

The principal determinant of the initial dilution rate with air of a two-phase jet released to the atmosphere is its velocity after depressurization to atmospheric pressure. The maximum possible velocity is obtained if it is assumed that the drop in pressure is converted to kinetic energy. Such methods are not conservative with respect to the reaction forces on the vessel, and they overestimate the velocity and hence the initial dilution rate. Conversely, models which account for the reactive forces unrealistically may underestimate the velocity, thus underestimating the initial dilution rates. Different models which utilize the extremes of assumptions involving the reactive forces have been proposed for estimating the initial jet velocity. It has been shown that the initial velocity can be an important determinant of the flammable extent of a jet release and, therefore, the determination of sensible designs for flammable fluid venting, controlled or accidental. This paper summarizes present models for flashing single-component, two-phase flow through orifices, and it describes an experimental program being developed aimed at verifying the important characteristics of such releases by studying flows of superheated water through orifices.