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HIGH PRESSURE AND HIGH TEMPERATURE FLASH-BOILING ATOMIZATION

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ABSTRACT

Flash atomization is a technique to generate fine spray which can be used for effective heat and momentum transfer. Pressure and temperature of liquid are among the main parameters to control the process. Nucleation, bubble formation, and atomization are stages of this process. Rapid heating or rapid depressurizing is used to make the metastable fluid and eventually the spray. Comprehensive understanding of characteristics of the spray is essential for applications such as heating and fuel injection. Therefore, in this research the effect of superheat degree on atomization was evaluated. Moreover, the effect of pressure and temperature of the fluid on spray characteristics were studied. The spray shape, breakup length, and spray angles were experimentally investigated to provide a better understanding and interpretation of observations. The result showed that a distinct dense core was surrounded with a sheath of less dense spray. An interesting finding from high-speed imaging is that the spray pulsation is negligible. It seems a high-quality spray is achievable as a result of flash-boiling atomization at high pressure and high temperature.