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Study of Air Entrainment by a Horizontal Plunging Liquid Jet MARIO TRUJILLO, SURAJ DESHPANDE, University of Wisconsin, XIONGJUN WU, GEORGES CHAHINE, Dynaflow, Inc. — The process of air entrainment following the impact of an initially horizontal circular water jet on a pool of water has been studied computationally and experimentally. It has been found that the entrainment of air cavities in the near field region is periodic, not continuous as reported in earlier studies. The simulations are based on a Volume-of-Fluid methodology with interfacial compression using a modified version of the open source utilities, OpenFoam. Close agreement with experiments is reported on the creation of cavities in the near field, where air entrainment occurs. The period of entrainment is found to be proportional to g, and a simplified closed-form solution for this periodic event is presented. An overall physical picture of the mechanisms leading to bubble formation is given. The far field, which is characterized by the presence of small bubbles is only partially resolved computationally. Comparisons against velocity data are performed in this region leading to adequate qualitative agreement.

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