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Bubble Fields in 3D (No Glasses Necessary) JESSE BELDEN, Naval Undersea Warfare Center, SAI RAVELA, Massachusetts Institute of Technology, TADD TRUSCOTT, Brigham Young University, ALEXANDRA TECHET, Massachusetts Institute of Technology — Resolution of the three-dimensional (3D) bubble fields induced by a turbulent circular plunging jet is approached using 3D Synthetic Aperture Imaging (SAI). 3D SAI is ideally suited to investigate optically dense multiphase flows due to its ability to reconstruct volumes that contain partial occlusions. Instantaneous bubble sizes and locations in the plunging jet bubble fields are extracted from the volumes and presented for various jet heights. The data are compared with existing literature on bubble penetration depth and size distributions and show excellent agreement. A scaling law for total air concentration as a function of depth below the free-surface is proposed, and is believed to be the first presentation of such a result. Coupled with scaling laws for the maximum air concentration and radial concentration profiles, this new scaling law can be used to determine the entire air concentration profile given a minimal number of single point measurements.

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