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Direct Numerical Simulations of Mixing: From Aeration Tanks to Food Mixers[1] SEUNGWON SHIN, Hongik University, South Korea, LYES KAHOUADJI, Imperial College London, JALEL CHERGUI, DAMIR JURIC, LIMSI, CNRS, France, RICHARD CRASTER, OMAR MATAR, Imperial College London
— The dynamics of stirred tanks has been studied over a wide range of laboratory and industrially conditions and scales, in order to improve the mixing efficiency. We use a three-dimensional two-phase flow dynamics solver coupled with a direct Forcing Method to handle accurately the fluid structure interaction occurring in any types of stirred tank. The numerical framework employed here circumvents numerous meshing issues normally associated with constructing complex geometries (impellers, baffles, etc.) within typical computational fluid dynamics packages. All these solid structures are constructed via a module that defines solid objects by means of a static distance function. Typical examples will be presented such us aeration (bubbly mixing), cavern formation (stirring viscoplastic fluids), and typical Egg Beaters with different types of fluid rheology.

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