335g Vortex Depths in Partially-Baffled Vessels with Pitched Blade Impellers - an Experimental and Correlational Study

W. Roy Penney and G. S Spanel

Experiments have been conducted in 0.241 m and 0.445 m diameter vessels using 4 blade pitched impellers with lower half-baffles. This impeller/baffle combination is the most common used industrially in partially-baffled vessels. Partially-baffled vessels are used extensively for the wetting of solids and enhancement of mass transfer between batch liquid and headspace gas. Impeller diameter and impeller off-bottom clearance have been varied along with the ratio of batch height to vessel diameter. The test fluids were water and corn syrup solutions. The baffles tested were so-called ‘half-baffles', which consisted of four baffles at 90 degrees to one another located in the bottom of the vessel with a baffle width of 1/12 the tank diameter and a baffle height of ½ the tank diameter. Dimensionless correlations have been obtained for relative vortex depth (i.e., ratio of vortex depth to impeller diameter) as a function of Froude Number, Reynolds Number, impeller diameter/tank diameter, impeller off-bottom clearance/tank diameter, and batch height/ vessel diameter.