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Experimental Study of Mixing Characteristics of a Flat Plate Paddle Mixer[1] DOUGLAS BOHL, NARATIP SANTITISSADEEKORN, ERIK BOLLT, Clarkson University — In this work a flat rectangular plate is rotated along its long axis and parallel to the z-axis of a circular cylinder. The blade position is varied with respect to the cylinder wall to allow investigation of the effect of the no slip boundary on the flow structure and mixing field. The cylinder is filled with a Newtonian fluid, glycerin, and driven at a Reynolds number of 8 based on the cylinder diameter. Particle Image Velocimetry is used to measure the velocity in the plane perpendicular to the rotation of the plate (i.e. in the r-θ plane of the cylinder). The experimental velocity field is used to numerically determine the motion of 100,000 simulated particle tracers for up to 25 cycles of the blade. Mixing rates and length scales are determined by noting the distribution of the particle tracers. Results show that when the paddle blade is centered in the tank there are three distinct regions in the flow. In the region where the blade sweeps there is no mixing and further no transport into or out of this region. At the tip of the blade there is a region of high mixing. However, towards the wall a moderate amount of mixing is observed.

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