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Parameters of a Steady State Model for In-Cylinder Flow of an Internal Combustion Engine[1] ELIZABETH FORTNER, Worcester Polytechnic Institute, PAUL PUZINAUSKAS, NICHOLAS BOLUS, University of Alabama — Flow structures in an internal combustion engine are critical to engine performance and fuel consumption. Experiments are often conducted to explore how intake port geometry can be modified to induce desired tumble and swirl flow structures within the cylinder. To make these experiments cost-effective, they are often first conducted using a model cylinder on a steady flow bench prior to, or in lieu of, performing full unsteady engine tests. This research examines how model characteristics and experimental configuration choices affect results on these steady-flow tests. The experimental set-up uses DPIV to visualize the flow and a horizontally extracting swirl meter to measure the strength of the tumble structure. The configurations and characteristics examined included model geometry, seeding particle type and location of flow induction. The symmetric geometry experiment investigates how extraction affects the flow structures inside the cylinder. Three different seeding particles were used to see how particle properties affect DPIV results. Reversing the direction of flow through the system causes set-up challenges with removing leaks and introducing seeding particles, but is safer as it directs particles away from the flow bench. Deviation of results from the different test set-ups may indicate that cylinder model experiments need to be carefully designed to ensure high quality results accurate enough for use in designing full scale engine tests.

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