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**Numerical investigation of vortex shedding behind a square cylinder oscillating in a closed channel** JOHN PITRE, JOSEPH BULL, University of Michigan — We investigate the vortex shedding behavior of a square cylinder oscillating longitudinally in a closed channel at a high blockage ratio (>80%). The square cylinder translates parallel to the long axis of the channel with a sinusoidal velocity of a given oscillation frequency. The incompressible Navier-Stokes equations in the Arbitrary Lagrangian-Eulerian formulation are solved using the finite element method. We vary both the Reynolds number and the Womersley number in order to quantify their effects on the vortex shedding. From the computational results, we calculate the Strouhal number and use this as a metric for the shedding behavior. At high Reynolds numbers, the flow is characterized by the presence of distinct vortex roll cells with long persistence times. At high Womersley numbers, these roll cells are increasingly likely to interact with the cylinder as it reverses direction and translates back across the channel.

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