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The Wake Behind a Rolling Sphere BRONWYN STEWART, Fluids Laboratory for Aeronautical and Industrial Research (FLAIR), Department of Mechanical Engineering, Monash University, Clayton 3800, Australia, THOMAS LEWEKE, Institut de Recherche sur les Phenomenes Hors Equilibre (IRPHE), 49 rue Frederic Joliot-Curie, BP 146, F-13384 Marseille Cedex 13, France, MARK THOMPSON, KERRY HOURIGAN, Fluids Laboratory for Aeronautical and Industrial Research (FLAIR), Department of Mechanical Engineering, Monash University, Clayton 3800, Australia — Experiments were carried out for a sphere translating along a wall with different rates of rotation, ranging from forward rolling, to pure sliding and backwards rolling. Flow visualizations have revealed four distinct flow regimes which exist for Reynolds numbers between 80 and 300. Dramatic changes in wake structure occurred, corresponding to different senses and magnitudes of the imposed rotation. Two steady flow regimes were observed and in this range of Reynolds number, the transition to unsteady flow led to either the shedding of vortex loops, similar to that for the isolated sphere, or an antisymmetric wake composed of a counter-rotating streamwise vortex pair.

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