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Experimental studies of one-way reaction front barriers in three-dimensional vortex flows[1] JOANIE GANNON, MINH DOAN[2], JJ SIMONS, Bucknell University, KEVIN MITCHELL, UC-Merced, TOM SOLOMON, Bucknell University — We present results of experimental studies of the evolution of the excitable, Ruthenium (Ru)-catalyzed, Belousov-Zhabotinsky (BZ) reaction in a three-dimensional (3D) flow composed of the superposition of horizontal and vertical vortex chains. The reaction fronts are imaged in 3D with a scanning, laser-induced fluorescence technique that takes advantage of the differential fluoresence of the Ruthenium indicated at the front. When the horizontal and vertical vortex chains are lined up, a dominant scroll structure is observed that acts as a one-way barrier blocking fronts propagating across vortex boundaries and into vortex centers. A second, quarter-tube barrier is observed along the edges of the unit cell. When the vortices are shifted relative to each other, tube-like barriers are observed in the interior. All of these barriers are compared with *burning invariant manifolds* predicted from a 6D set of differential equations describing the evolution of front elements in the flow.

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