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Streamline Patterns and Eddies in Slipping Stokes Flow D. PALANIAPPAN, Texas A&M University - Corpus Christi — Streamline topologies are analyzed in the vicinity of boundaries in the limit of Stokes flow with Navier slip boundary conditions for some simple flows involving two- and three-dimensional configurations. It is found that the streamline pattern transformations, and consequently the flow fields are sensitive to the non-dimensional slip parameter λ. For two-dimensional flows, the separated/attached eddies - that are known to exist in the no-slip case at the contour - get destroyed or pushed away from the boundary as the slip is varied. Analysis of flow generated by a point force (stokeslet) inside a spherical container reveals that when the stokeslet is positioned at the center of the container, the eddy pattern - that is noted in the no-slip case - undergoes a series of transformations due to slip variations and eventually disappears. Furthermore, the parameter λ dictates the locations of the stagnation point and the point of zero vorticiy in the flow domain. Our analytical solution indicates that the *co-existence of a stagnation point (r_{stag}) and a point of zero vorticity ($r_{\Omega=0}$) in the flow region is necessary for the occurrence of closed eddies.* The results may be of some interest in small scale hydrodynamics in which Stokes flow occurs.

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