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Point vortex dynamics on a toroidal surface[1] TAKASHI SAKAJO, YUUKI SHIMIZU, Kyoto Univ — Interactions of vortex structures play an important role in the understanding of complex evolutions of fluid flows. Incompressible and inviscid flows with point-wise vorticity distributions in two-dimensional space, called point vortices, have been used as a theoretical model to describe such vortex interactions. The motion of point vortices has been investigated well in unbounded planes with boundaries as well as on a sphere owing to their physical relevance. On the other hand, it is of a theoretical interest to investigate how geometric nature of curved surfaces and the number of holes gives rise to different vortex interactions that are not observed in vortex dynamics in the plane and on the sphere. In the preceding studies, point-vortex interactions on surfaces of revolution have been investigated. In this presentation, we derive the equation of motion of point vortices on a toroidal surface, which is a compact, orientable 2D Riemannian manifold with a non-constant curvature with one handle. We then investigate the motion of two point vortices and the stability analysis of a latitudinal ring configuration of N point vortices.

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Takashi Sakajo
Kyoto Univ

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