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Shedding timing of secondary vortices from a rotating plate DIEGO FRANCESCANGELI, KAREN MULLENERS, Ecole Polytechnique Federale de Lausanne — Many vortex generators involve the formation of a primary vortex followed by the occurrence of other coherent structures. When a vortex is formed from an accelerated plate or from a piston-cylinder apparatus, it grows up to a limit when it pinches-off.Beyond this point, swirling structures akin to a Kelvin-Helmholtz instability are observed. All the coherent structures generated after the formation of the primary vortex are called secondary vortices. In the present study, we investigate the shedding timing of secondary vortices, generated around a rotating rectangular plate in a quiescent flow. Time-resolved PIV images show that secondary vortices are discretely released from tip during the plate motion and they are not generated from the stretching of an unstable shear layer. Once separated from the plate, secondary vortices evolve in time following a self-similar curve well approximated by Kaden's spiral. From this result, we compute the time position of each secondary vortex along the spiral and fit it with a second order polynomial curve. The parabolic fit allows to estimate the pinch-off moment of secondary vortices and retrieve the timing of the entire shedding process. Between 6 and 7 secondary vortices every 20° are observed for all the tested Reynolds number.

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