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The Time-Resolved Flow Field of a Spatially Oscillating Jet in Crossflow F. OSTERMANN[1], R. WOSZIDLO[2], C.N. NAYERI[3], C.O. PASCHEREIT[4], Hermann-Föttinger-Insitut, Technische Universität Berlin — Spatially oscillating jets in crossflow emitted by fluidic oscillators have been proven beneficial for flow control applications in recent studies. However, the driving mechanism behind the efficacy remains unknown. The presented study examines the fundamental, time-resolved flow field of a spatially oscillating jet in crossflow. The inclination angle between oscillation plane and crossflow is 90deg . The underlying experimental dataset is acquired plane-by-plane by a traversable stereoscopic particle image velocimetry system. Phase-averaging reduces stochastic noise, compensates low sampling rates, and allows combining the individual planes to a time-resolved three-dimensional flow field. The trajectory of the oscillating jet is much shallower than a steady jet. Two counter-rotating streamwise vortices are revealed. The sense of rotation is opposite to that of the counter-rotating vortex pair of steady jets in crossflow. This sense of rotation enables the vortices to prevail far downstream because they push each other toward the wall. The strength of the vortices is alternating. This vortex pair is a promising candidate to be the driving mechanism behind the high efficacy in separation control.

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