Inertial migration of spherical particles in submillimeter-sized square channel flows HIROYUKI SHICHI, HIROSHI YAMASHITA, JUNJI SEKI, TOMOAKI ITANO, MASAKO SUGIHARA-SEKI, Kansai University — The distributions of neutrally buoyant spherical particles were measured at downstream cross-sections of submillimeter-sized square channels for the Reynolds number from 1 to 800. Polystyrene particles of diameter $d = 30 - 70\mu m$ were suspended in water-glycerol mixture at the volume concentration of $2.5 - 11 \times 10^2 cm^{-3}$, and this suspension was made to flow through square channels of width $D = 400 - 800\mu m$ and length $L = 50 - 600mm$. The Reynolds number (Re) was defined in terms of the average flow velocity and the channel width. For the size ratio $d/D = 0.075 - 0.125$, we found that for $Re < 260$, particles were focused on four equilibrium positions placed at the center of channel faces, which was in accord with previous experimental and numerical studies. For $Re > 450$, four additional equilibrium positions were observed near the channel corners. Between these two Reynolds numbers (i.e., $260 < Re < 450$), we observed new equilibrium positions located on a heteroclinic orbit connecting the channel face and corner equilibrium positions. These new equilibrium positions were shifted towards the corner equilibrium positions with increasing $Re$. 

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