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**Flow instability and vortex street in eccentric annular channels**[1]

GEORGE CHOUEIRI, STAVROS TAVOULARIS, University of Ottawa — Flow development in an eccentric annular channel with a diameter ratio of 0.5 has been investigated using flow visualization, two-component laser Doppler velocimetry and planar and stereoscopic particle image velocimetry. The eccentricity $e$ was varied between 0.3 and 0.9 and the Reynolds number was $1000 \leq \mathrm{Re} \leq 18000$. For sufficiently large $e$ and Re, large differences developed between the velocity in the gap region and the one in the rest of the channel; these were accompanied by flow instability and the generation of a quasi-periodic vortex street, which manifested itself by strong cross-flows across the gap and an increase in axial velocity in the gap region, but also affected the flow in the entire channel. The vortex strength was highest for $e \approx 0.7$ and the Strouhal number of the cross-flow oscillations (based on bulk velocity and core diameter) increased with increasing Re, reaching an asymptote near 0.12 for $\mathrm{Re} \geq 10000$.

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