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Further experiments and analysis on flow instability in eccentric annular channels[1] MARC-ETIENNE LAMARCHE-GAGNON[2], STAVROS TAVOULARIS, Univ of Ottawa — Gap instability (GI), an inviscid, Kelvin-Helmholtz type, was investigated experimentally and numerically in an eccentric annular channel with an inner-to-outer diameter ratio $d/D = 0.5$ and a length of 320 hydraulic diameters, under conditions not sufficiently documented in the literature, namely, low and moderate eccentricities ($0 < e \leq 0.5$) and Reynolds numbers in the range $Re 12\,000$. It was found that, in laminar flow, GI occurred for e as low as 0.05. When, however, the flow was turbulent in at least part of the cross section, GI remained strong only for $e \geq 0.5$, but was essentially undetectable for $e \leq 0.3$. For e lower than 0.5, the critical Reynolds number increased with decreasing e. Within a range of low-e or low-Re conditions, quasi-periodic flows were highly intermittent and less energetic in an upstream section of the channel, but became progressively less intermittent further downstream. The energy of such motions generally increased with increasing streamwise distance, e and Re. By exception, this energy decreased with increasing Re for $e \leq 0.3$ and $Re > 2000$. A stability map was constructed and an improved physical model of the gap vortex street was proposed.

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