Barkley, Dwight; **Henderson, Ronald D.**

Three-dimensional Floquet stability analysis of the wake of a circular cylinder. (English)

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Summary: Results are reported from a highly accurate, global numerical stability analysis of the periodic wake of a circular cylinder for Reynolds numbers between 140 and 300. The analysis shows that the two-dimensional wake becomes (absolutely) linearly unstable to three-dimensional perturbations at a critical Reynolds number of 188.5 ± 1.0. The critical spanwise wavelength is 3.96 ± 0.02 diameters and the critical Floquet mode corresponds to a 'mode A' instability. At Reynolds number 259 the two-dimensional wake becomes linearly unstable to a second branch of modes with wavelength 0.822 diameters at onset. Stability spectra and corresponding neutral stability curves are presented for Reynolds numbers up to 300.

MSC:

76E99 Hydrodynamic stability
76D25 Wakes and jets

Keywords:

mode A instability; stability spectra; periodic wake; three-dimensional perturbations; neutral stability curves

Full Text: DOI

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