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Effect of an Oscillating Cylinder on a Neighbouring Cylinder Wake

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This work aims to investiagte numerically how an oscillating fluid-structure system influences vortex shedding from a neighbouring stationary cylinder. The numerical technique employed is a newly developed lattice Boltzmann method. The calculation was carried out at Re = 150 for a two-dimensional flow around two side-by-side circular cylinders, one oscillating laterally at an amplitude A/d = 0 1 and frequency fe/fo = 0.4 1.6. The cylinder centre-to-centre spacing T/d varied from 1.8 to 3.5. The numerical data reconfirm previous experimental finding that the oscillation of one cylinder can lock in vortex shedding from a neighbouring stationary cylinder as well as from the oscillating one. It is further found that the fe/fo range over which the locked-in response is observed grows as A/d increases. As T/d increases, this range shrinks at a fixed A/d because of the fading oscillating influence. Furthermore, the dependence of typical flow structures, drag and lift on A/d, fe/fo and T/d are also examined.

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