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Numerical investigation of aeroacoustic behavior of flow over tandem cylinders applying large eddy simulation approach

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Abstract

In this research, the sound produced by vortices interactions of unsteady flow over tandem cylinders is investigated. Cylinders geometrical effects on the flow aeroacoustic behavior are numerically studied applying the large eddy simulation approach, the Curl theory, and the Ffowcs Williams-Hawkings model. Numerical validation and its accuracy are investigated using the available experimental results. The sound detected by the microphones shows good agreement compared to the experimentally recorded sounds at different power spectrums. According to the obtained results, flow separation over the cylinder occurs at 118 degrees measured from the flow stagnation point and at the Strouhal numbers of 0 to 0.5, magnitude of noise power spectrum density varies between 60 to 95 dB. Also, the sound pressure level in the range of considered Strouhal numbers decreases from 10 dB to zero dB, logarithmically.

Keywords: Vortices Interactions, Tandem Cylinders, Aeroacoustic Phenomenon, Strouhal Number

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