NEWS | DECEMBER 13 2019

Method of controlling flow around tandem cylinders can reduce damage FREE

Savannah Mandel

Scilight 2019, 501105 (2019)
https://doi.org/10.1063/10.0000307

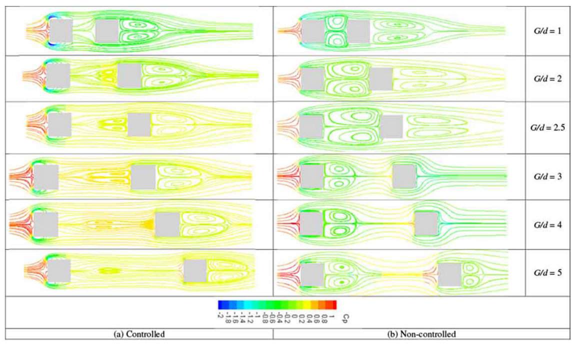
Scilight

10 December 2019

Method of controlling flow around tandem cylinders can reduce damage

Savannah Mandel

Using a suctioning and blowing technique, scientists discovered how to minimize damage done to tandem cylinders by vortex shedding and vibration.



Understanding fluid dynamics around cylinders can help scientists learn how to control active flow and to reduce damaging forces. Controlling active flow can be used to reduce vortex shedding, which is the main source of structural vibration and damage to structures like support columns under bridges and the tubes in heat exchangers.

Flow control around a single cylinder has been previously studied. Sohankar et al. advanced this research one step further by studying many cylindrical structures in line and how flow moves around them. When more than one structure is in a group, it complicates the fluid wake. In their numerical study, the authors had to consider factors such as shear layer separation/reattachment, quasi-periodic gap vortices, vortex impingement and wake evolution to learn how to control flow.

“The mutual interaction leads to very high fluctuating forces, structural vibrations, acoustic noise, or resonance, which, in some cases, causes an immediate failure,” said author Mahbub Alam.

The authors used suctioning and blowing to actively control the flow around tandem square cylinders and to study heat transfer between the cylinders. Blowing impeded heat transfer between the cylinders, while suctioning improved it. They compared two methods of controlling flow. The first controlled flow around the upstream cylinder, and the second controlled flow around both cylinders.

The authors demonstrated a 70% reduction of total drag force when control was applied to both cylinders and successfully suppressed time-mean and fluctuating forces.

“Drag reduction and elimination of force fluctuation on the bodies can minimize the energy dissipation and cost for many applications,” said Alam.

The authors hope to extend these numerical simulations to experiments, which could work with engineering applications.

Source: “Control of flow and heat transfer over two inline square cylinders,” by A. Sohankar, M. Khodadadi, E. Rangraz, and Md. Mahbub Alam, *Physics of Fluids* (2019). The article can be accessed at https://doi.org/10.1063/1.5128751.