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Complete Suppression of Fully-Developed Vortex Shedding and Vortex-Induced Vibration for a Cylinder in Cross-Flow by Release of an Internal Nonlinear Energy Sink.[1] ANTOINE BLANCHARD[2], ARNE J. PEARLSTEIN, University of Illinois at Urbana-Champaign — For Reynolds numbers below the critical value for a fixed circular cylinder, we show how fully-developed, large-amplitude, vortex-induced vibration of a linearly-sprung cylinder can be completely suppressed by release of an internal rotating "nonlinear energy sink," consisting of a mass rotating about the axis of the translating cylinder and a dissipative element that damps the rotational motion of the mass. The approach involves no modification to the cylinder boundary, with the effects being due to inertial coupling of the rotation of the internal mass to the rectilinear motion of the cylinder. The response is characterized in terms of the time required to reduce the vibration amplitude below a certain threshold. Implications for flow control, and for "switching" of mixing are discussed.

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