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In-line flow-induced oscillations of a flexibly-mounted square prism TYLER GURIAN, YAHYA MODARRES-SADEGHI, Univ of Mass - Amherst — Flow-induced oscillations of a flexibly-mounted square prism allowed to oscillate in the inline (parallel to flow) direction were studied experimentally in a recirculating water tunnel. Experiments were first carried out using a circular cylinder to validate the experimental set up. At low angles of attack, $0 < \alpha < 5$ degrees (where 0 degrees represents the case where the flow is perpendicular to a face of the square prism), oscillations are triggered when the shedding frequency reaches one half of the system's natural frequency. The resulting oscillations occur at a frequency close to the system's natural frequency. The frequency of oscillations decreases slightly at higher flow velocities. At mid-range angles of attack, $10 < \alpha < 20$ degrees, oscillations are triggered slightly after the shedding frequency reaches one half of the system's natural frequency. Oscillations are initially at the system's natural frequency, but quickly become low frequency oscillations. Amplitudes increase linearly with flow velocity. At higher angles of attack, $25 < \alpha < 45$ degrees, oscillations are triggered at progressively higher flow velocities. These low-frequency unsteady oscillations increase in magnitude linearly with flow velocity. Maximum amplitudes are close to 20% of the cylinder diameter.

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