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Chaos in VIV YAHYA MODARRES-SADEGHI, MICHAEL TRIANTAFYLLOU, MIT — In this study the existence of chaotic oscillations in signals from vortex induced vibrations is investigated using some experimental data of flexible risers. VIV is traditionally known as a periodic phenomenon for which the oscillations are mainly at a fundamental frequency of oscillations. As observed recently, in many VIV signals, there is a second peak at three times the fundamental frequency, which represents the existence of a third harmonic oscillation. This view is based on analyzing a statistically stationary region of experimental VIV signals. The original non-filtered signals, however, do not show a statistically stationary behavior in the entire period of oscillations. Practically, the major part of the signal illustrates non-stationary behavior. Here, we do not limit our analysis to the statistically stationary regions; instead, we use the entire experimental signal. The time histories, PSD and phase plane plots, and Poincaré maps of analyzed signals show cases where the signal is (i) mainly periodic/quasiperiodic or (ii) periodic/quasiperiodic with bursts of chaos or (iii) entirely chaotic.

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