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Mode Switching of Rain–Wind Induced Vibrations

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Rain-wind induced vibrations are a vibration phenomena that occurs when rain and wind act simultaneously on cables, hangars and ropes. The vibration phenomena may induce oscillations with large amplitudes, thus the fatigue of construction elements is possible. In the literature rain-wind induced vibrations are generally investigated in the range of low wind speeds. Continuative experiments in the wind tunnel show that rain-wind induced vibrations exist in the range of higher wind speeds, too. Significant for rain-wind induced vibrations is the mode switching between vibrations in the range of low wind speeds and vibrations in the range of higher wind speeds. A possible mechanism of excitation of rain-wind induced vibrations is described by the phenomena of the Prandtl tripwire and in consideration of rivulets as a movable disturbance. It is shown that the excitation mechanism in the range of low wind speeds is different from the mechanism in the range of higher wind speeds.

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