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and historical review; 2.1.2.1 Vibration mechanisms; 2.1.2.1.1 Bending vibration of a circular cylindrical structure in steady flow 2.1.2.1.2 Vibration of a circular cylinder in oscillating flow 2.1.2.1.3 Ovaling vibrations of cylindrical shells in steady flow; 2.1.2.2 Historical background; 2.1.2.2.1 Bending vibrations of a circular cylinder in steady flow; 2.1.2.2.2 Vibration of a circular cylinder in oscillating flow; 2.1.2.2.3 Ovaling vibrations of cylindrical shells in steady flow; 2.1.3 Evaluation methods; 2.1.3.1 Bending vibrations of a circular cylinder in steady flow; 2.1.3.1.1 Vibration induced by single-phase flow; 2.1.3.1.2 Vibration induced by two-phase flow 2.1.3.2 Vibration of a circular cylinder in oscillating flow 2.1.3.3 Ovaling vibrations of cylindrical shells in steady flow; 2.1.4 Examples of component failures due to vortex-induced vibration; 2.2 Two circular cylinders in cross-flow; 2.2.1 Outline of structures of interest; 2.2.1.1 Examples; 2.2.1.2 Classification based on flow type; 2.2.1.3 Classification based on spatial configuration; 2.2.2 Historical background; 2.2.2.1 Excitation phenomena; 2.2.2.1.1 Vibration of cylinder pairs subjected to steady cross-flow; 2.2.2.1.2 Oscillatory-flow-induced vibration; 2.2.2.2 Research background 2.2.2.2.1 Steady-flow-induced cylinder vibration 2.2.2.2.2 Oscillatory flow; 2.2.2.2.3 Vibration of cylinder pairs in two-phase flow; 2.2.3 Evaluation methodology; 2.2.3.1 Experimental evaluation; 2.2.3.1.1 Vibration of cylinder pair in single-phase flow; 2.2.3.2 Theoretical modeling; 2.2.3.2.1 Wake interference mathematical model; 2.2.3.2.2 Fluid-structure coupled analysis; 2.2.3.2.3 Determination of instability boundary by unsteady fluid force models; 2.2.3.2.4 Quasi-steady theory; 2.2.4 Examples of practical problems; 2.3 Multiple circular cylinders; 2.3.1 Outline of structures considered 2.3.2 Vibration evaluation history

Sommario/riassunto

In many plants, vibration and noise problems occur due to fluid flow, which can greatly disrupt smooth plant operations. These flow-related phenomena are called flow-induced vibration. This book explains how and why such vibrations happen and provides hints and tips on how to avoid them in future plant design. The world-leading author team doesn't assume prior knowledge of mathematical methods and provides the reader with information on the basics of modeling. The book includes several practical examples and thorough explanations of the structure, the evaluation method
