

1. Record Nr.	UNINA9910453190703321
Titolo	Flow-induced vibrations : classifications and lessons from practical experiences // editors, Shigehiko Kaneko [and seven others]
Pubbl/distr/stampa	London : , : Academic Press, , 2014
ISBN	0-08-101318-3 0-08-098352-9
Edizione	[Second edition.]
Descrizione fisica	1 online resource (423 p.)
Altri autori (Persone)	KanekoS (Shigehiko)
Disciplina	423
Soggetti	Machinery - Vibration Machinery - Vibration - Mathematical models Structural dynamics Structural dynamics - Mathematical models Fluid dynamics Fluid dynamics - Mathematical models Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Front Cover; Flow-Induced Vibrations: Classifications and Lessons from Practical Experiences; Copyright Page; Contents; Preface; 1 Introduction; 1.1 General overview; 1.1.1 History of FIV research; 1.1.2 Origin of this book; 1.2 Modeling approaches; 1.2.1 The importance of modeling; 1.2.2 Classification of FIV and modeling; 1.2.3 Modeling procedure; 1.2.3.1 Simplified treatment; 1.2.3.2 Detailed treatment; 1.2.4 Analytical approach; 1.2.5 Experimental approach; 1.2.5.1 Test facilities; 1.2.5.2 Similarity laws; 1.2.5.2.1 Structural model; 1.2.5.2.2 Fluid model 1.3 Fundamental mechanisms of FIV1.3.1 Self-induced oscillation mechanisms; 1.3.1.1 One-degree-of-freedom system; 1.3.1.2 Two-degrees-of-freedom system; 1.3.1.3 Multi-degrees-of-freedom system; 1.3.2 Forced vibration and added mass and damping; 1.3.2.1 Forced vibration system; 1.3.2.2 Added mass; 1.3.2.3 Fluid damping; References; 2 Vibration Induced by Cross-Flow; 2.1 Single circular cylinder; 2.1.1 Structures under evaluation; 2.1.2 Vibration mechanisms

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  
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2.3.2 Vibration evaluation history

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## 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

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