Leopold-Franzens Universität Innsbruck

Ort:	Baufakultät, Technikerstr. 13 Hörsaal **HSB6** (EG)
Datum:	**Thu 4 February 2010**
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IfM Guest Lectures

Prof. G. I. Schuëller

MECHANIK-GASTVORTRÄGE

Stochastic load models for life cycle analyses of civil engineering structures

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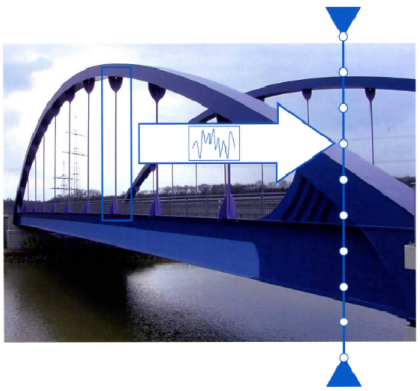
Abstract

Structural damage evolutions affect adversely the planned life cycle of engineering structures. Mechanical loading due to wind actions on structures or structural components causes such serious lifetime-related deteriorations. Especially cyclic responses of structural components are considered in this contribution. The ensemble of such load effects during the lifetime of a structural component is responsible for the evolution of structural degradation - not the rare extreme loading events. Repeated wind gust effects at lower levels of intensity as the extreme gust effect of 50-years return period are modeled employing Weibull distributions, the influence of the wind compass can be included.



Resonant vortex excitation of slender structural components, such as cylinders but also such as bluff bridge sections, is a classical aerodynamic interaction mechanism of stochastic nature which can cause high-cycle responses with large amplitudes. The damage accumulations due to both types of excitation of cyclic stresses are often evaluated after the Palmgren-Miner rule. As an alternative, the succession of damage due to vortex induced resonance can be modeled through the adaption of renewal and pulse processes. Such procedure is described in the contribution. The required stochastic data is evaluated from full scale and wind tunnel experiments employing a new forced motion mechanism

On the Author

- Full Professor for Building Aerodynamics and Fluid Mechanics in Civil Engineering (since 2003), Ruhr-University Bochum, topics: wind engineering, random vibrations of structures, probabilistic and damage-oriented load models
- State-Approved Proofing Engineer for Structural Safety (since 2010, Germany)
- Consulting Engineer (1997-2003) at Florence (Italy) and Düsseldorf (Germany)
- Doctoral degree (1996), thesis title: Stationary and non-stationary models for the simulation in time domain of wind forces at line-like structures
- Research Assistant at the Danish Maritime Institute, Copenhagen, Denmark and the institute CRIACIV, University of Florence, Italy (1995-1997)
- Research Assistant at the Cooperative Research Center SFB 151, "Structural Dynamics", Ruhr-University Bochum (1989-1994)

Gäste sind herzlich willkommen!