FOREWORD

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Daniele Zonta¹ · Branko Glisic²

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Structural health monitoring aims to understand the condition of a structure based on sensor measurements, which are typically affected by noise and errors. Similarly, the relationship between observations and structural state is often nondeterministic. Key questions are how to provide a reliable and robust diagnosis, properly accounting for uncertainties, and how to bridge the gap between the data acquisition and decision making on such issues as structural maintenance, repair and replacement. The goal of this special issue is to gather together civil SHM cases where complex uncertainty problems have been successfully solved using probabilistic data interpretation methods.

The six papers in this special issue do not require extraneous elucidation.

The article by Yáñez-Godoy and Schoefs is an application to on-pile quays, where the authors demonstrate that the uncertainties can be handled using no other than polynomial chaos. Zhang, McDaniel and Wang use a

statistical method to estimate pavement macrotexture depth, using measurements from a microphone mounted underneath a moving vehicle. Oshima, Funamizu and Sugiura take advantage from a vehicle as well, but this time to identify bridge response characteristics, using stochastic analysis. Not surprisingly, most of our applications deal with bridges. So do Wang, Ni and Lin in their work, focused on statistical counting methods to extract peak values for reliability assessment. And a bridge is the case study that Malekzadeh, Atia and Catbas use to demonstrate their hybrid data interpretation framework. In another article, the authors use probability to model the engineer, rather than the bridge. This is the case presented by Capello, Zonta, Pozzi, Glisic and Zandonini, which serves as the introduction to this special issue on Probabilistic Structural Health Monitoring.

✉ Branko Glisic
bglisic@princeton.edu

¹ Department of Civil, Environmental and Mechanical Engineering, University of Trento, Trento, Italy

² Department of Civil and Environmental Engineering, Princeton University, Princeton, NJ, USA