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Anastasios G. Sextos · George D. Manolis  
Editors

# Dynamic Response of Infrastructure to Environmentally Induced Loads

Analysis, Measurements, Testing, and Design

 Springer

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# Preface

This book is the result of a three-year effort that paralleled the evolution of the research work conducted for the project entitled *DEutschland & GRIEchenland LABbtoratory (DeGrieLab): Hybrid and Virtual Experimentation for Infrastructure Lifecycle Maintenance and Natural Hazard Resilience* ([www.degrielib.eu](http://www.degrielib.eu)). This project was funded by the Deutscher Akademischer Austausch Dienst (DAAD) agency under contract number 57055451, and the actual duration was from January 1, 2014 to December 31, 2016. The project principal investigators from the German side were Professor Carsten Konke and Dr. Volkmar Zabel, Department of Civil Engineering, Bauhaus Universitat Weimar (BUW), in close collaboration with Professor Frank Wuttke who was the initial acting PI. Their counterparts from the Greek side were Associate Professor Anastasios G. Sextos (now serving a dual appointment with Department of Civil Engineering, Bristol University, Bristol, BS8 1TR, UK) and Prof. George D. Manolis, Department of Civil Engineering, Aristotle University (AUTH).

A number of international scientific events were organized in the framework of the above project, namely a workshop on Dynamic Analysis, Testing and Design of Infrastructure to Environmental Loads in Thessaloniki (November, 11–13/2014), followed by a same topic workshop held at Bauhaus Universitat Weimar (August, 24–26/2015) and a final workshop organized in Chalkidiki, Greece, on Recent Developments in Structural Health Monitoring for a Resilient Infrastructure (June, 31/5–3/2016). Two summer schools were also organized in Weimar and Thessaloniki in 2014 and 2015, respectively. The educational and research presentation material as well as 60 videos of the talks has all been made publically available in the project educational channel in YouTube (shortcut: <https://tinyurl.com/jjzxlxa>).

This book includes invited chapters by the participants of the last two workshops and encompasses five broad areas in civil engineering infrastructure, namely (a) structural health monitoring of bridges, (b) seismic excitation, monitoring, and response of buildings, (c) soil-structure interaction, (d) numerical methods, and (e) hybrid and experimental mechanics. The chapters are authored by project partners of the *DeGrieLab* project and colleagues from Europe and North America and can be classified as follows.

Chapters 1 and 2 deal with issues regarding the seismic response assessment of R/C bridges. Chapters 3–5 discuss bridge testing in terms of hybrid simulations, open field tests, and bridge component testing on an intercontinental scale through Internet linking. Chapter 6 is on the experimental assessment of isolators for existing R/C bridges, while Chap. 7 examines the mechanical response and numerical analysis issues for base isolators used in buildings. Chapters 8–10 present material on the various experimental testing possibilities for earthquake engineering purposes and component testing on shaking tables, on structural imaging techniques, and on structural health monitoring using wireless sensors, respectively. Chapters 11–14 focus on soil-structure interaction issues, energy-based methods, and inelastic dynamic analysis methods for R/C bridges, buried tunnels, buildings, and bridge piers, respectively. Finally, Chap. 15 closes with the quantification of seismic collapses of buildings.

This book is intended for practicing engineers, researchers, and graduate students. We hope that such readers will find this book useful for their work.

Finally, the editors would like to thank Mrs. Kleoniki Kyrkopoulou, MA, for her precious contribution in everyday management of the project as well as for proofreading the contents of the book. Thanks are also due to all who contributed and worked under this project, namely faculty, students, and administrators, as well as the Deutscher Akademischer Austausch Dienst (DAAD) agency for its generous support. We believe that this project contributed toward strengthening the academic ties between Greece and Germany and promoted mutual understanding and long-term collaboration among the partners involved.

DeGrie Lab Project Educational Portal



DeGrie Lab Workshop, Thessaloniki, Greece (November, 11–13/2014)



DeGrie Lab Workshop, Weimar, Germany (August, 24–26/2015)



DeGrie Lab Workshop, Weimar, Germany (August, 24–26/2015)

Thessaloniki, Greece

Anastasios G. Sextos  
George D. Manolis



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