

Session ID: GRM-1

Title

ROTATIONAL SEISMIC GROUND MOTIONS AND THEIR ENGINEERING SIGNIFICANCE

Convenors

Z. Zembaty ¹, H. Igel ²

Description

In addition to 3 translations on the ground surface one can also measure 3 rotations about these axes. The 3 translations, 2 rockings about horizontal axes, and the torsion about the vertical axis define together 6 component point surface ground motion (6c). Ground rotations attracted attention of seismologists and engineers from the mid 70s, with Emilio Rosenblueth [1] as a pioneer engineer in this area. Yet, only about 15 years ago, measuring methods matured enough to develop rotational seismology as a quantitative discipline, and IWGoRS working group was initiated (<https://www.rotational-seismology.org/>) followed by special issues of journals [2,3,4]. Despite this progress, the rotational seismic effects are still not implemented into engineering practice, which may be important e.g. for rocking ground motions acting on tall buildings and towers adding extra seismic load.

This session will cover:

- modern instrumentation and measuring of rotational ground motions,
- rocking seismic effects on tall buildings and slender towers,
- rotations in soil structure interaction and structural response,
- approximate methods and code proposals.

A large audience of engineers and seismologists will be invited to discuss how the progress in 6c ground motion sensing can be better introduced into seismic engineering practice.

References

- [1] Rosenblueth, E., Tall Buildings under Five Component Earthquakes. J. Struct. Div. ASCE 102, 1976, p. 455
- [2] Lee et al. Introduction to the Special Issue on Rotational Seismology and Engineering Applications, BSSA, 2009, vol. 99, no. 2B, p. 945
- [3] Igel H., et al. Preface to special issue on advances in rotational seismology: instrumentation, theory, observations and engineering, J. Seismol., vol. 16, 2012, p. 571
- [4] Zembaty Z. et al., Rotation Rate Sensors and Their Applications, Sensors, 2021, 21(16), 5344, <https://doi.org/10.3390/s21165344>

Invited Speakers

M. Todorovska ³, P. Gueguen ⁴, C. Smerzini ⁵, H. Igel ², A. Castellani ⁵, Z. Zembaty ¹, F. Bernauer ⁶

Affiliations

¹ Opole University of Technology, Opole, Poland, ² Ludwig-Maximilians-University, Munich, Germany, ³ University of Southern California, Los Angeles, USA, ⁴ Universite Grenoble Alpes, Grenoble, France, ⁵ Politecnico di Milano, Milano, Italy, ⁶ Geophysical Observatory Furstenfeldbruck, Furstenfeldbruck, Germany