

# ISSUES WITH THE USE OF SPATIALLY VARIABLE SEISMIC GROUND MOTIONS IN ENGINEERING APPLICATIONS

Aspasia Zerva<sup>1</sup>, Mohammad Reza Falamarz-Sheikhabadi<sup>2</sup>, Masoud Khazaei Poul<sup>3</sup>

## ABSTRACT

Even though the significance of the spatial variability of seismic ground motions for the response of lifelines and its modeling from array data have been addressed for more than half a century, there are still issues associated with its use in engineering applications, which are the focus of the present paper. Common approaches for the simulation of spatially variable seismic ground motions are reviewed, and their corresponding uncertainties are discussed in detail. The importance of the consideration of rotational ground motions in the seismic excitation of structures, and the significance of the kinematic soil-structure interaction in the modification of the foundation input motions are addressed. In addition, difficulties with absorbing boundary conditions and one-dimensional deconvolution methods, when the spatial variability of the ground motions is considered in the seismic analysis of structures, are elaborated upon, and the necessity of developing three-dimensional coherency models is noted. This critical investigation provides insight into and facilitates the appropriate simulation of spatially variable seismic ground motions in engineering applications.

---

<sup>1</sup>Professor, Civil, Environmental and Architectural Engineering Department, Drexel University, Philadelphia, USA, [zervaa@drexel.edu](mailto:zervaa@drexel.edu)

<sup>2</sup>Researcher, Civil, Environmental and Architectural Engineering Department, Drexel University, Philadelphia, USA, [m.falamarz@gmail.com](mailto:m.falamarz@gmail.com)

<sup>3</sup>Ph.D. Candidate, Civil, Environmental and Architectural Engineering Department, Drexel University, Philadelphia, USA, [masoud.poul@gmail.com](mailto:masoud.poul@gmail.com)