

IMPORTANCE OF SOIL-STRUCTURE INTERACTION WHEN USING PERFORMANCE-BASED DESIGN

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Abstract:

Seismic design of structures under the strong shaking assumes that highly inelastic material response is unavoidable. In most designs, the behavior of the soil where the structure is founded is ignored. A considerable amount of evidence shows that soil–foundation plastic yielding under seismic excitation is unavoidable, and sometimes this can be a desirable effect. When performing PBD, designers consider that all the energy transferred by the strong shaking is dissipated on the structure. Tall-slender structures tend to experience large inertial forces that lead to overturning moments on the foundation that may be unusually large compared to the vertical load. The foundation may experience uplifting of one edge from the supporting soil and will lead to increased normal stresses under the opposite edge of the foundation making the foundation system acts like a fuse.

About



the Author:

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Carlos heads Dynamis' Earthquake Engineering team where he manages technically complex projects, both large and small. His specialist skills are in structural dynamics, finite element analysis, seismic engineering, bridges, offshore engineering and tall buildings. He has experience in a range of engineering fields including offshore, rail, buildings and nuclear facilities and has worked on projects in six continents around the world.

Carlos holds dual master's degrees in Industrial Engineering from the Universidad Politécnica de Madrid, as well as a master's degree in Civil Engineering from Ecole Nationale des Ponts et Chaussées in Paris, France. Prior to founding Dynamis, Carlos first worked for a Structural Engineering firm specialized in high-rise design in New York before returning to Paris to work for one of the leading Earthquake Engineering companies in the world. Carlos's projects range from working on the biggest commercial center in France, the INTER IKEA mall, to performing probabilistic nonlinear soil structure interaction analyses on numerous nuclear power plants. In addition to running Dynamis, Carlos is an active contributor to the earthquake engineering industry, conducting training seminars at the Oger Institute in Paris and at his alma mater in Madrid. Associations: French Association for Earthquake Engineering (AFPS), Colegio Oficial de Ingenieros Industriales de Madrid (COIIM), the Earthquake Engineering Research Institute (EERI) and the American Society of Civil Engineers (ASCE).

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