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Structural system identification of steel structures

The need for structural system identification, model updating and health monitoring is constantly growing as the structural stock of modern societies is getting considerably bigger. In order to ensure that an already built construction is structurally sound, data can be gathered from nondestructive dynamic or static tests or dynamic behavior can be recorded from ambient vibration. Whereas the methods to study dynamic data have been thoroughly studied and developed, much less attention has been paid to the study of nondestructive static tests. A new parametric method for structural system identification which is based in a mathematical technique called observability will be presented. It is said that a subset of variables is observable when the system of equations implies a unique solution for this subset, even though the remaining variables remain undetermined. This leads to the observability problem that has a relevant role in many engineering problems, among them the structural system identification. The application of observability will lead to identify which are the relevant measurement sets to be used in order to identify a given set of targeted structural parameters. The applications of such method to identify structural unknowns, such as bending of axial stiffness's, from measured deflections or rotations, will be outlined. The impact of measurement errors on the accuracy of the solution will be highlighted as well as different techniques to improve the results of the estimates for steel bridges and building frames.

Biography

Jose Turmo (Spain, 1974) got his 6-year program degree in Civil Engineer (1998) from University of Cantabria (Santander, Spain) and his PhD (2003) in Construction Engineering from Technical University of Catalonia BarcelonaTech- UPC (Barcelona, Spain). At the moment, he is Professor in the School of Civil Engineering in Barcelona, BarcelonaTech (Spain), where he teaches Construction Engineering. His area of expertise is Bridge Engineering and Structures.

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