The Probabilistic Analysis of Vienna Stadium Roof Structure

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Abstract

The paper deals with probabilistic analysis of the Ernst Happel stadium`s roof – roof of the biggest stadium in Austria. The presented contribution extends the analyses carried out after 25 years lifetime. The numerical model of the stadium`s roof was identified on the base of dynamical measurements and was initially analysed using deterministic approach. Considering the uncertainties of stiffness and loading of the roof, probabilistic analyses were carried out. The uncertainties were modelled with help of truncated Gaussian distribution as statistical distribution function. The Monte Carlo Simulation and the Response Surface Method were applied. The output parameters which affect the dynamic behavior of the stadium roof were analyzed with help of response surface. The sensitivities of natural frequencies and modes on the uncertainties of stiffness and loading are presented.

Keywords: Stadium roof, finite element model, statics, dynamics, probabilistic analysis.

Figure 1. Ernst Happel Stadium in Prater - Vienna

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