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Modeling building vibrations in a wide frequency range

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For the prediction of vibration and noise levels in buildings we do not have one single general modeling method. The finite element method (FEM) has an upper frequency bound due to the rapid increase of model size; statistical energy analysis (SEA) on the other hand has a lower bound, determined by modal density. In order to perform meaningful calculations in the whole frequency range, we need some kind of combination of these methods. We don't have a good method for characterizing excitations generated by ground vibrations either. In this paper we examine, how to connect FE and SEA and how to apply their combination for the prediction of building vibrations. For our investigations a building lying beside an underground metro-line is taken. We present the results of vibration and noise measurements, and compare them to results obtained by means of various modeling approaches