

**ACOUSTICS2008/2653**  
**Simulation and analysis of tire road noise, finite element results  
and validation**

Maik Brinkmeier<sup>a</sup>, Udo Nackenhorst<sup>a</sup>, Jan Biermann<sup>b</sup> and Otto Von Estorff<sup>b</sup>

<sup>a</sup>Institut für Baumechanik und Numerische Mechanik, Appelstraße 9A, 30167 Hannover, Germany

<sup>b</sup>Institut für Modellierung und Berechnung, Denickestraße 17, 21073 Hamburg, Germany

This presentation shows the methods and results of the German research project "Silent Traffic". The main topics are the simulation of tire road noise as well as the validation of the methods and finite element models. The target is to understand the mechanisms of sound generation and to get suggestions to reduce the traffic noise resulting from the virtual system. The investigations are based on a physical modeling of the tire road system rather than on the processing of statistical data. The simulation procedure can be decomposed into four steps: The computation of non-linear stationary rolling, the eigenvalue analysis in the deformed state, the analysis of road surface textures, and the calculation of the noise radiation including a modal superposition approach with an excitation by deterministic functions. Thereby, the numerical model enables for a detailed analysis of certain effects of the sound generation and radiation that contribute to the overall tire road noise. The simulation results are compared to measurements, both for structural dynamics and acoustics, to show the quality of the model and to indicate possible improvements for further development.