

## DAGA 2013

**Title:** Comparison of directly and indirectly measured forces for tire-road noise analysis

**Short title:** Indirect force determination

**Classification:** Vehicle acoustics (Fahrzeugakustik)

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### **Abstract:**

An important task of Transfer Path Analysis is estimating the forces induced by a source into a structure. In practice, it is usually very elaborate or sometimes even impossible to measure these forces directly. Hence, a commonly used approach is an indirect force determination based on operational accelerations and inverted inertance matrices gained from measurements with an impact hammer. A challenge of indirect force determination is considering a strong coupling of structure and source in an appropriate way to distinguish between different connection points. The suspension system of a car is such a strongly coupled system. A transverse control arm, which is a major transfer element of tire-road noise, is applied on a test rig for a detailed analysis. On one side the control arm with triangular shape can be excited by a shaker and on the other side it is connected via its two elastomeric bushings to the test rig. At each bushing a force sensor is placed to allow a direct measurement of induced forces in three dimensions. They are compared with indirectly-determined forces under manageable conditions. Conclusions will be drawn for the case when the transverse control arm is installed in the car.

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