Session: Tyre/road excitation

Tire-road noise analysis of on-road measurements under dynamic driving conditions

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The power train noise of cars has been reduced in the last decades. Therefore in many cases, rolling tires have increasingly become the dominant sources of vehicles' interior noise. For sound design or a reduction of tire-road noise it is important to know the individual noise shares of the tires and their transfer paths. Authentic tire-road noise can only be measured on a real road, not on a roller dynamometer. So far measurements have been performed during a coast-down on the road with the engine switched off, avoiding the influence of engine noise.

Operational **P**ath **A**nalysis (OPA) can be used to remove the uncorrelated wind noise, and to synthesize structure-borne and airborne tire-road noise based on input signals measured with microphones at the tires and a triaxial accelerometer at each wheel carrier. Simultaneously, the interior noise is recorded by an artificial head.

Acceleration, deceleration or other driving maneuvers with the engine running can lead to different tire noises. In this case the conventional method cannot be applied because the engine sound is measured at the source (tires) and receiver locations (cabin). This would lead to wrong OPA transfer functions and the tire-road noise synthesis would contain unwanted engine sound shares. Thus, a **C**ross **T**alk **C**ancellation (CTC) must be carried out between the tire and engine sources.

In this paper a new approach is presented allowing a tire-road noise analysis under dynamic driving conditions. The applied CTC requires additional input signals at the engine.

Keywords:
- tire-road noise separation
- acoustic comfort
- binaural auralization
- operational path analysis
- cross talk cancellation