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Tire radiation in vehicle environment: a review of some source identification methods

Christophe Picard^a, Matthieu Fiack^b, Olivier Tanneau^c, Olivier Sauvage^a and Laurent Gagliardini^a

^aPSA Peugeot Citroën, Route de Gisy, 78943 Vélizy-Villacoublay Cedex, France

^bSegula Technologies for PCA, Route de Gisy, 78943 Vélizy-Villacoublay Cedex, France

^cAltran AIT for PCA, Route de Gisy, 78943 Vélizy-Villacoublay Cedex, France

The REBECA research project aims at defining new architectural concepts and reduction strategies of vehicle external noise emission regarding the international pass-by noise certification standard (ISO 362). The first task of the project is to qualify and quantify the major contributor of the external emission, the tires/road surface source. To this end, a 3D array composed of 164 microphones has been set up in the near and far field around vehicle. Measurements have been performed for several operational conditions with the use of a chassis dyno in a semi-anechoic chamber. A review and a comparison of some source identification methods has been led including experimental FRFs based on inverse techniques (Nelson), conventional and optimized beamforming approaches (Elias, Dougherty, Brooks and Humphreys, Ravetta) and inverse BEM method (Hamdi, Omrani). This study permits to identify the more appropriate microphone array technique with respect to source identification robustness, power level and directivity radiation reconstruction in the far field.