



Engine sources Identification using an Inverse BEM technique

C. Glandier¹, T. Vogt², J. Morkholt², A. Omrani³ and M. A. Hamdi³

¹Daimler AG, Sindelfingen GERMANY
Email: christian.c.glandier@daimler.com

²Innovations Group ,Brüel &Kjær A/S , Naerum, DENMARK

³STRACO SA, Compiègne, FRANCE

ABSTRACT

Acoustic equivalent source models play an important role in the automotive NVH design process. Such models represent the sound radiated by an engine e.g. with a set of point sources distributed over the engine's surface. These models can be used in combination with either measured or computed Noise Transfer Functions. This paper presents an investigation of engine noise radiation using a novel hybrid technique that allows the determination of surface equivalent sources. The method is based on the combination of up-to-date measurement techniques and a numerical Inverse Boundary Element Method (I-BEM). Starting from the measurement of the sound field surrounding a radiating object , the noise sources on the object's surface are identified using the I-BEM technique. This method is applied to a Mercedes-Benz A-class engine, in order to investigate its vibrational behaviour and predict the sound levels in the far field. Prior to the application to the real engine, the technique was tested on an engine mock-up equipped with six independently driven volume velocity sources. In this setup, the source positions as well as their volume velocities and time correlations are well known. The known source positions are well identified by the software. Good agreement is also obtained on farfield. microphones, both for the mockup and for the real running engine.