

Analysis of exhaust muffler with micro-perforated panel

Abstract

An expansion chamber muffler with the use of a micro-perforated panel (MPP) was developed to improve the acoustic performance. A simulation was carried out using the SysNoise application in the LMS Virtual Lab based on the boundary element method, and the model was verified with the transmission loss measurement using the two-load method and showed good agreement. There was a 40 % accuracy improvement in the BEM model compared to the analytical approach for the simple expansion chamber muffler. The results showed that the performance of this muffler with an 80 mm air cavity depth improved by 75 %, where the transmission loss curve of the muffler became broader, and the hump-shape of the curve was more flat at the top when compared with the performance of a conventional simple expansion chamber muffler. The new muffler with the MPP was applied to a small utility engine with a displacement of 35 cc and the results showed that the noise level was reduced by 20 dBA for the frequency band of 125 Hz to 4000 Hz.

Keywords

Boundary element method (BEM); Micro-perforated panel (MPP); Muffler; Transmission loss (TL)