

Experimental validation of sound quality simulation and optimization of a four-cylinder diesel engine

某四缸柴油机声品质仿真优化与试验验证

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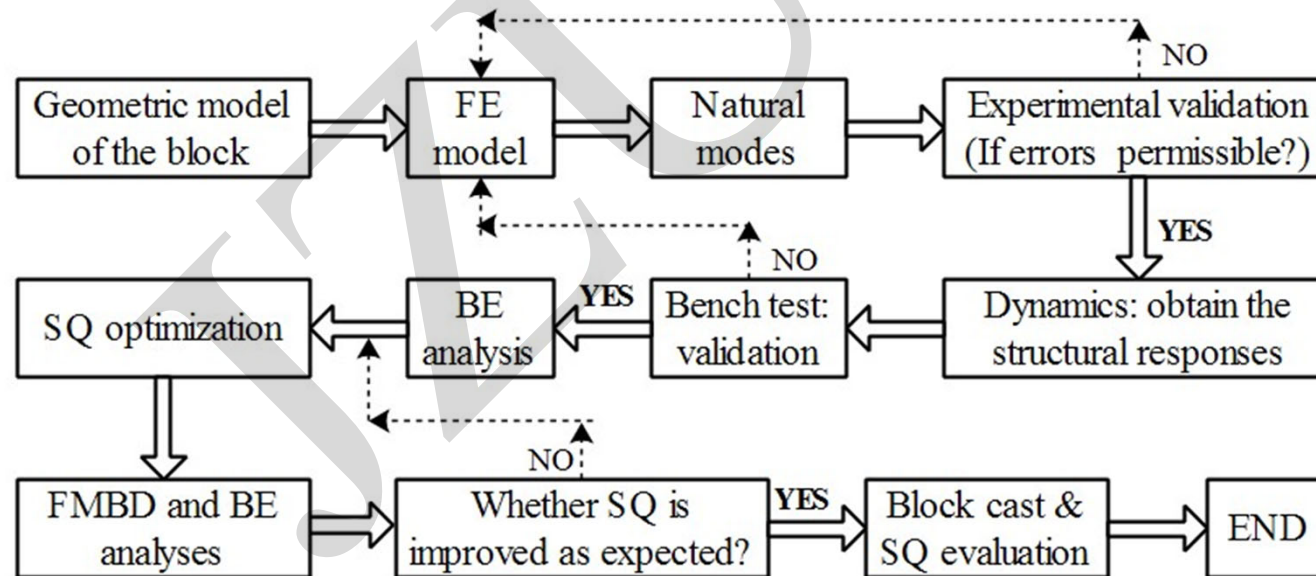
Main goal of this paper

A novel sound quality simulation approach was proposed to optimize the acoustic performance of a four-cylinder diesel engine.

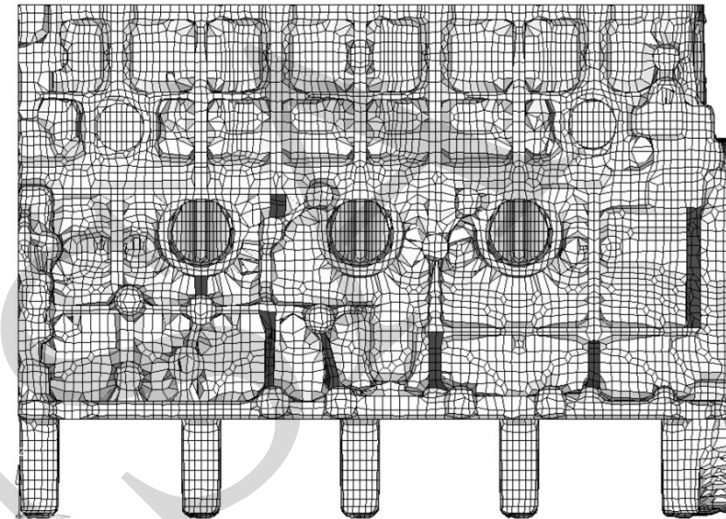
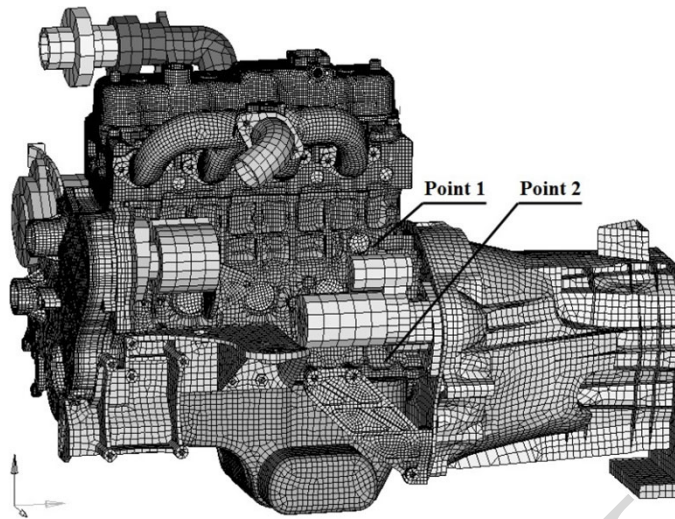
Main aspects involved in the new sound quality algorithm

Establishment of equivalent rectangular bandwidths (ERBs), acoustic transfer functions of monaural listening, and structural-acoustic optimization of the engine block.

Sound quality optimal design procedure



Computational model and results



The complete engine model was constructed to simulate the vibro-acoustic response.

Structural optimization was implemented to reduce the noise and improve the sound quality.

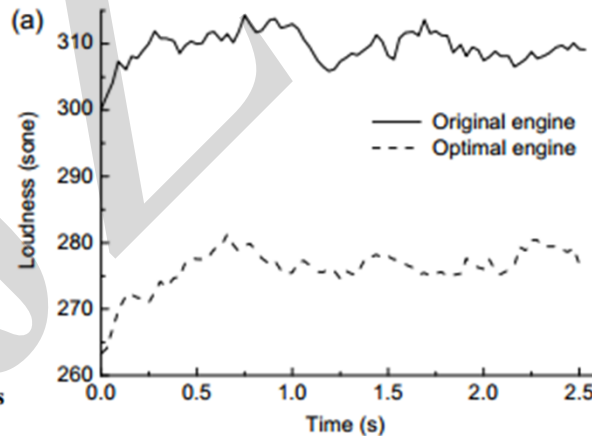
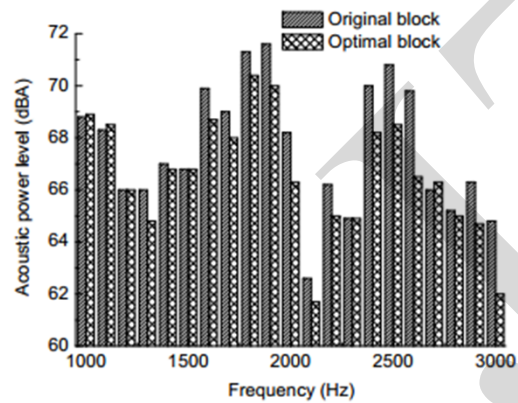


Fig. 9 Radiated acoustic power level from the block's face before and after optimization

The structural radiated noise of the engine block is reduced. The sound quality of the engine is substantially improved.