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Application of aero-acoustic CFD methods to predict wind noise levels over the side glass of motor vehicles

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As the powertrain noise of motor vehicles get silent, customers complain more of flow related noise (called wind noise in the industry) that is especially dominant at highway speeds. In order to produce silent vehicles, engineers need to make critical decisions at very early design phase to optimize the shape of the vehicle for least Aeroacoustic excitation. This poses a problem as experimental methods are still dominant at this field and there is no physical bucks to conduct wind tunnel tests with at early design phases. Moreover, companies that do not have a wind tunnel of their own face both financial and timing problems to conduct wind tunnel tests at outside facilities. For these reasons, applying computational methods to predict wind noise level over the side glass of a vehicle will help engineers to take actions at the very start of the design phase and decrease the amount of time that needs to be spent in the wind tunnel. This study aims at developing a reliable CFD based aero-acoustic simulation methodology for motor vehicles. Reliability of the methodology is tested by comparing calculation results with wind tunnel test results, which is done in two steps: In step one overall pressure fluctuations on the side glass of a light commercial vehicle are calculated and compared to the results of wind tunnel tests conducted with surface microphones. In step two: wooden obstacles are placed on a pillar of the same vehicle. Difference of surface pressure fluctuations on the side glass between base condition and the condition with the obstacle is both computationally calculated and tested in the wind tunnel. Two results are compared to understand methodology's prediction capability for exterior surface changes.

Biography

H Can Koman works in Interior Quietness department of Ford Otosan, a joint venture to Ford motor company. His main work is focused on Aero-Acoustics, both experimental and computational. He has worked on light and heavy commercial vehicle projects from scratch to finish to deliver vehicles that would meet targeted customer expectations for flow related interior cabin noise.

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