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Modification of an interface parameter between sub-system and vehicle: case of a fan system attached to the front end of a car

Saul Mapagha^a and Vincent Martin^b

^aCEVAA, Technopole du Madrillet, 2 Rue Joseph Fourier, 76800 Saint Etienne du Rouvray, France

^bInstitut Jean Le Rond d'Alembert, UMR CNRS 7190, UPMC, 2 Place de la Gare de Ceinture, 78210 Saint-Cyr l'Ecole, France

The car industry, as well as many others, is constantly undergoing modifications to comply security and comfort regulations. Among the major causes for concern is the integration of sub-systems on vehicles. In fact, when a sub-system runs on a vehicle, it can lead to vibrations on the body of the car and thus acoustical radiations, causing trouble for the passengers, and also outside the vehicle. The frequency response functions (FRF)-based substructuring technique and impedances coupling methods are used to predict the forces entering the vehicle from those measured on a test bed. When a given constraint on the forces entering the vehicle is not satisfied, the car supplier may choose to modify the interface parameters between the substructures. In this paper an analytical approach to filter the entering forces by elastic suspension is proposed. An application is given by way of numerical experiments on a fan system attached to the front end of a car, both subsystems being identified through measurements.