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Aerodynamic pitching damping of vehicle-inspired bluff bodies MAKOTO TSUBOKURA, SEEYUAN CHENG, Hokkaido University, TAKUJI NAKASHIMA, Hiroshima University, TAKAHIDE NOUZAWA, YOSHIHIRO OKADA, Mazda Motor Corporation — Aerodynamic damping mechanism of road vehicles subjected to pitching oscillation was investigated by using large-eddy simulation technique. The study was based on two kinds of simplified vehicle models, which represent real sedan-type vehicles with different pitching stability in the on-road test. The simplified vehicle modes were developed so as to reproduce the characteristic flow structures above the trunk deck of the real vehicles measured in a wind-tunnel at the static case without oscillation. The forced sinusoidal pitching oscillation was imposed on the models and their pitching damping factors were evaluated through the phase-averaged pitching moment. Then flow structures in the wake of the models were extracted and its contribution to the damping mechanism was discussed. It was found that slight difference of the front and rear pillars' shape drastically affects the flow structures in the wake of the models, which enhance or restrain the vehicles' pitching instability.

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