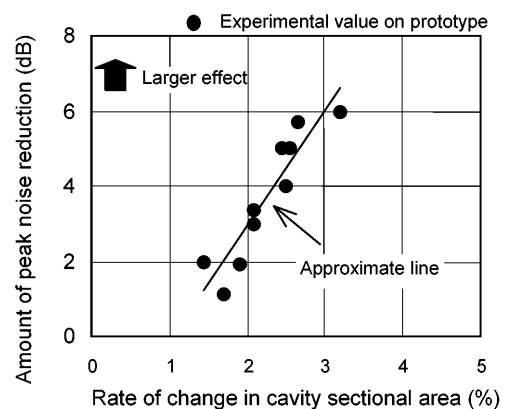
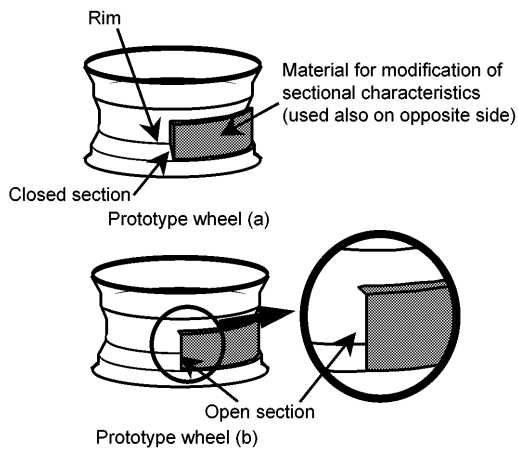
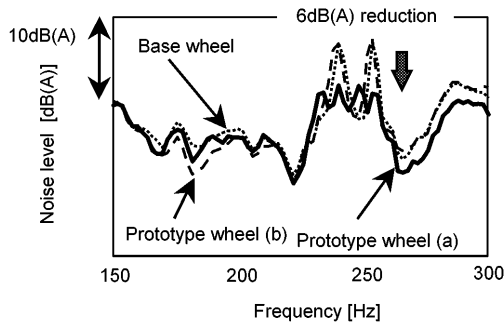


# Theoretical Analysis of Tire Acoustic Cavity Noise and Proposal for Improvement Technique

Hiroshi YAMAUCHI\*



The author of "Theoretical Analysis of Tire Acoustic Cavity Noise and Proposal for Improvement Technique" received for his paper the Asahara Prize Science Promotion Award of the Society of Automotive Engineers of Japan's (JSAE's) 52nd Technical Awards, presented in 2003. The selection committee expressed high praise for the new technology, describing it as, "a valuable technology for improvement of human-automobile-environment interaction; one that is well matched to contemporary demands for creation of a human-friendly environment; and one that has significant potential for adoption in all vehicles".

The paper first shows that the mechanism by which tires generate annoying road noise during driving can be explained by an original theory that the author deduced from basic principles (not relying on existing theories). It then proposes a new wheel structure embodying the theory, discusses several prototype wheels based on the structure, and shows the results of experiments performed on the prototypes.

In the proposed wheel structure, small indents and

projections are formed on the tires and wheels to cause the sectional form of the tire's inside cavity to vary circumferentially. Appropriate location of the indents and projections makes it possible to limit deterioration of ride quality to a minimum.

A detailed study of the proposed wheel structure with regard to cost and weight is now being conducted as part of moves toward volume production. Should volume production be realized, the new-structure wheels will enable customers to enjoy unprecedented ride comfort in their vehicles.



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