

## Optimization of Loudspeaker Part Design Parameters by Air Viscosity Damping Effect

**Authors :** Yue Hu, Xilu Zhao, Takao Yamaguchi, Manabu Sasajima, Yoshio Koike, Akira Hara

**Abstract :** This study optimized the design parameters of a cone loudspeaker as an example of high flexibility of the product design. We developed an acoustic analysis software program that considers the impact of damping caused by air viscosity. In sound reproduction, it is difficult to optimize each parameter of the loudspeaker design. To overcome the limitation of the design problem in practice, this study presents an acoustic analysis algorithm to optimize the design parameters of the loudspeaker. The material character of cone paper and the loudspeaker edge were the design parameters, and the vibration displacement of the cone paper was the objective function. The results of the analysis showed that the design had high accuracy as compared to the predicted value. These results suggested that although the parameter design is difficult, with experience and intuition, the design can be performed easily using the optimized design found with the acoustic analysis software.

**Keywords :** air viscosity, design parameters, loudspeaker, optimization

**Conference Title :** ICMMNO 2016 : International Conference on Mathematical Modelling and Numerical Optimisation

**Conference Location :** Singapore, Singapore

**Conference Dates :** November 21-22, 2016