

진공청소기 원심 환의 소음원 분석 및 공력 소음 예측

Investigation of the noise sources for the centrifugal fan and aeroacoustic noise prediction

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Abstract

In many practical applications of the centrifugal fan, the impeller-diffuser interaction noise is considered as a main source of fan noise. The housing for an electric motor is also expected to play an important role on noise propagation because of its complicated configuration. This study investigates the impeller-diffuser interaction noise and its sources by computing three-dimensional, incompressible flow field of the centrifugal fan in motor housing. The effect of motor case on fan noise characteristic is then investigated using the Brinkman penalization method, while the noise source associated with impeller-diffuser interaction is mathematically modeled. It is found that the present methodology combined with mathematical description of noise source provides a fairly good agreement with the experimental results, indicating that the motor housing has significant effect on noise characteristics. Finally, aeroacoustic noise prediction for various impeller-diffuser blade count ratios is conducted for noise reduction.

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