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# 자유후류법과 CFD 해석을 통한 저소음 고효율 자동차용 냉각팬 개발에 관한 연구

# Study on Low noise, High Performance Automobile Cooling Fan Development Using Freewake and CFD Analysis

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**Key Words** : Axial fan, Fan Noise, Fan Design, System Resistance

**ABSTRACT**

Automobile cooling fans are operated with a radiator module. To design low noise, high performance cooling fan, radiator resistance should be considered in the design process. The system (radiator) resistance reduces axial velocity and increases effective angle of attack. This increasing effective angle of attack mechanism causes blade stall, performance decrease and noise increase. In this paper, To analyze fan performance, freewake and 3D CFD calculations are used To design high performance fan with consideration of system resistance, optimal twist concept is applied through momentum and blade element theory. To predict fan noise, empirical formula and acoustic analogy methods are used.

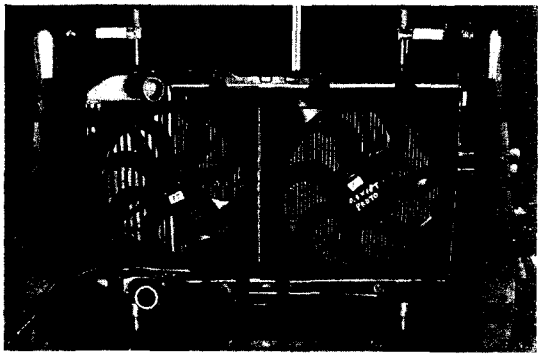

Fig 1. automobile cooling fan system

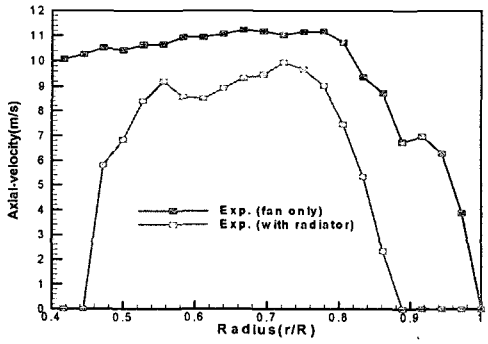


Fig 2. axial velocity distribution

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