

# Research for Aerodynamic Noise Reduction of a Centrifugal Compressor

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## Abstract

Industrial centrifugal compressor is widely used in oil & gas field such as petroleum refining plants, gas pipeline, etc. Recently, lower noise level as well as high reliability and high performance are demanded. In this project, investigation of elucidation and prediction of resonance phenomena due to fluid interaction between impeller and vane-diffuser in a centrifugal compressor is targeted by using CFD technology.

To obtain knowledge of such aeroacoustic phenomena occurring inside of a compressor, analysis of enormous large scale as well as unsteady compressive flow with high speed rotation in transonic region should be enabled, consequently, a numerical simulation of Large Eddy Simulation (LES) methodology using Earth Simulator was carried out.

In first step, a coarse mesh model was created for a single-stage compressor, and it was confirmed that simulated results of fluctuated pressure distribution has a good agreement with corresponding experiment. On the other hands, a few of mechanism in our code have been improved in order to adapt vector computer of Earth Simulator. Really, some effort should be exerted in this project continuously, so as to contribute to engineering innovation of noise reduction.

**Keywords:** Noise, Resonance, Centrifugal Compressor, Pressure Fluctuation, LES