

Development of High-Speed and Highly Accurate Numerical Analysis Technology of Rotating Machine by 3-D Finite Element Method

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Abstract

The improvement of the efficiency of the rotating machines has been strongly desired to address environmental problems.

The aim of this project is (i) to develop a parallel computing method using the 3-D finite element method for the magnetic field analysis of rotating machines, and (ii) to achieve the high-speed and highly accurate large-scale magnetic field simulation of rotating machines.

In this year, we developed a parallel computing method for rotating machines excited from voltage sources, and carried out the large-scale simulation of an IPM motor.

As a result, we clarified the influence of off-center of the rotor on the various characteristics of the IPM motor.

It is thus confirmed that the characteristics of rotating machines driven by the voltage sources can be efficiently analyzed in parallel on the Earth Simulator.

Keywords: rotating machine, off-center, magnetic field analysis, finite element method with edge elements, domain decomposition method