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

Project Representative

Masanori Nakamura

TOYO DENKI SEIZO K.K.

Authors

Masanori Nakamura[*1], Yoshihiro Kawase[*2], Tadashi Yamaguchi[*2], Shingo Ukai[*2],
Tomohito Nakano[*2], Noriaki Nishikawa[*3]

＊1　TOYO DENKI SEIZO K.K.

＊2　Gifu University

＊3　Japan Agency for Marine-Earth Science and Technology

Abstract

We have been developed a magnetic field analysis software using the 3-D finite element method with edge elements running on personal computers. One of purpose of our project is to modify the software for the Earth Simulator, and to improve the software for a large-scale magnetic field analysis of motors.

In this year, which is the first year of this project, we modified the software for the Earth Simulator : linear solver from ICCG (Incomplete Cholesky Conjugate Gradient) method to SCG (Scaled Conjugate Gradient) method that is appropriate for parallel processing, and the storage method of a coefficient matrix from CRS (Compressed Row Storage) for scalar processor to DJDS (Descending order Jagged Diagonal Storage) for the vector processor.

As a result, we succeeded to reduce the calculation time to 1/190 of the calculation time by the conventional software.

Keywords:　motors, magnetic field analysis, finite element method, scaled conjugate gradient method