

ANALYSIS OF REACTOR VESSEL BY DOMAIN DECOMPOSITION METHODS

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Keywords: domain decomposition, Schur complement method, FETI-DP method, parallel computing

Abstract

Detailed and complex analyses of reactor vessels of nuclear power plants are very complicated and computationally demanding. This contribution deals with mechanical and thermal analyses of an existing reactor vessel made from prestressed concrete. The analyses has to described 33 years of construction and life of the vessel. The vessel has to be modelled as a three-dimensional problem. With respect to symmetry, only one eighth of the vessel is used in the analysis.

The specified analyses are very computationally demanding and they take several weeks on a modern single-processor computer. Therefore, the analyses are conducted in parallel and domain decomposition methods are applied. The Schur complement method is used in all analyses while the FETI-DP method is applied for some of them. Both methods are described in reference [1].

Very demanding analyses have been conducted on a cluster of PC's. Application of the cluster speeds up the analyses significantly and solves some problems with sizes of output files.

Acknowledgement: Financial support for this work was provided by project 103/07/1455 of Czech Science Foundation. The financial support is gratefully acknowledged.

References

- [1] J. KRUIS, *Domain decomposition methods for distributed computing*, Saxe-Coburg Publications, Kippen, Stirling, Scotland, UK, 2006.