

**A Balancing Domain Decomposition Method Combined
with Diagonal Scaling Preconditioner for Multi-materials**

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For many of actual problems in science and engineering fields, there should be modeled with multi-materials and large-scale unstructured mesh. In numerical analysis using the iterative methods, such problems will suffer from slow convergence or no convergence. In here, the balancing domain decomposition (BDD) method is a well-known for its very fast convergence rate. However, considering composition of very different materials, the convergence rate of the BDD is also shown to be worse. In this study, to accelerate convergence of BDD for multi-materials, a BDD method combined with diagonal scaling preconditioner is proposed.

Keywords: Balancing domain decomposition, Multi-materials, Domain decomposition method, Parallel computing