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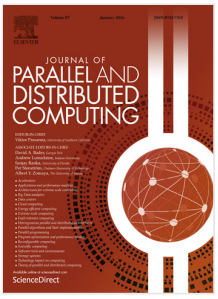

Distributed Newest Vertex Bisection

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***Highlights (for review)**

In this paper, we investigate theoretical aspects of the *Distributed Newest Vertex Bisection*. The paper contains the following highlights:

- We prove bounds on the number of global communications needed we executing the Distributed Newest Vertex Bisection, a variant of parallel conforming mesh adaptation.
- If the grid fulfills a compatibility condition that is described in the paper, the number of iterations of the Distributed Newest Vertex Bisection can be computed a priori, and therefore, no global communication is needed at all.
- A communication hiding exchange mechanism for the exchange of refinement flags during the refinement algorithm is presented.
- Numerical examples show that the proven bounds are sharp.
- Strong scaling for the parallel-adaptive algorithm on a peta scale super computer is presented.
- The discussed algorithms are implemented in the open-source software DUNE-ALUGrid (`https://gitlab.dune-project.org/extensions/dune-alugrid`) which is a module of the open-source software framework DUNE (`www.dune-project.org`) and for public download.

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