

Computational fluid dynamics on wildly heterogeneous systems

In the last decade, high-order methods have gained increased attention. These combine the convergence properties of spectral methods with the geo-metrical flexibility of low-order methods. With restrictive time steps, implicit treatment of diffusion and pressure terms is mandatory. Therefore, efficient solution of elliptic equations is of central importance for fast flow solvers. As the operators scale with $O(p \cdot \text{nDOF})$, where nDOF is the number of degrees of freedom and p the polynomial degree, the runtime of the best available multigrid algorithms scales with $O(p \cdot \text{nDOF})$ as well. This super-linear scaling limits the applicability of high-order methods to mid-range polynomial orders, constituting a major road block towards faster flow solvers. This work reduces the super-linear scaling of elliptic solvers to a linear one. The devised methods are combined into a flow solver, which preserves this linear scaling. Furthermore, a multigrid method reduces the cost of implicit treatment of the pressure to the one for explicit treatment of the convection terms. Lastly, benchmarks confirm that the solver outperforms established high-order codes.



34,90 €

32,62 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9783959084246

Medium: Buch

ISBN: 978-3-95908-424-6

Verlag: TUDpress

Erscheinungstermin: 18.01.2021

Sprache(n): Englisch

Auflage: Erscheinungsjahr 2021

Produktform: Kartoniert

Seiten: 172

Format (B x H): 170 x 210 mm

