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A Robust Lattice Boltzmann Method for Parallel Simulations of Multicomponent Flows in Complex Geometries

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**Highlights**

- We present a robust and efficient Lattice Boltzmann Method for non-ideal mixtures on octree meshes.
- We analyze boundary conditions for the presented model.
- Well-posedness of the implicit-to-explicit variable transformation of the Lattice Boltzmann Method is shown.
- Massively parallel simulation of a realistic mixing process in a porous media with billions of species elements.
- We demonstrate high computational performance on a high ranked TOP500 system.

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