

**Level Set-based Topology Optimization Method for Flow Channel Problem
Using Lattice Boltzmann Method**

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A topology optimization method for fluid problems is presented. In most of these researches, the fluid motion is governed by the Navier-Stokes equation, which often causes numerical oscillation during the optimization process. Due to its nonlinearity, the numerical method such as FEM cannot be used efficiently for topology optimizations due to its cumbersome ways of moving boundary treatment and its heavy computation loads that undergo repeatedly during the topology changes of the flow field. Meanwhile, the lattice Boltzmann method (LBM) has attracted as a numerical approach for solving fluid problems. Since the LBM is formulated as a linear and explicit scheme, its computation algorithm becomes much simpler, and is known as a specific scheme for multi-phase and porous flows. In this research, we construct a topology optimization method using the LBM, and use the level set method to represent the clear boundaries of the flow fields in the optimal configurations.

Keywords: Topology optimization, Level set method, Lattice Boltzmann method, Adjoint method.