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**On the search of more stable second-order lattice-Boltzmann schemes in confined flows.**

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Summary: The von Neumann linear analysis, restricted by a heuristic selection of wave-number vectors was applied to the search of explicit lattice Boltzmann schemes which exhibit more stability than existing methods. The relative stability of the family members of quasi-incompressible collision kernels, for the Navier-Stokes equations in confined flows, was analyzed. The linear stability analysis was simplified by assuming a uniform velocity level over the whole domain, where only the wave numbers of the first harmonic normal to the flow direction were permitted. A singular equilibrium function that maximizes the critical velocity level was identified, which was afterwards tested in particular cases of confined flows of interest, validating the resulting procedure.

**MSC:**

**76M28** Particle methods and lattice-gas methods

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**Keywords:**

linear stability; incompressible flow; von Neumann analysis

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