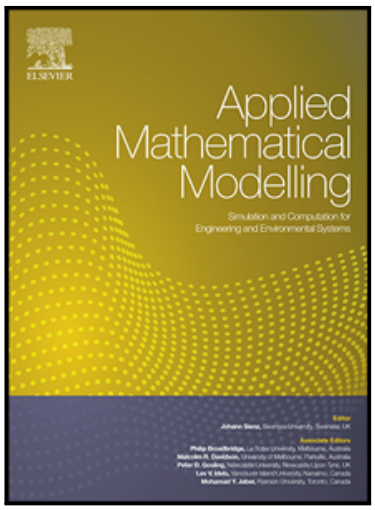


# An explicit staggered-grid method for numerical simulation of large-scale natural gas pipeline networks

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**Highlights**

- We developed and present new numerical method tailored for simulating transient flows in large-scale gas pipeline networks.
- New methodology for modeling general nodal/boundary conditions in uniform way for gas injections/withdrawals/compressors etc.
- We prove second-order accuracy and mass conservation, derive the stability condition, and validate these results numerically.
- We present several computational examples verifying theory and test importance of incorporating various physical phenomena.