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An interior penalty method for a large-scale finite-dimensional nonlinear double obstacle problem

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**Highlights**

- Novel interior penalty formulation for large-scale bounded NCPs in engineering.
- Proof of unique solvability of the penalty equation.
- Establishment of convergence theory for the penalty method.
- Jacobian matrix in Newton method shown to be positive-definite and an M-matrix.
- Linearized system in Newton method decomposable into two decoupled subsystems.

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