

A new strategy for solving nonlinear complementarity problems arising in thermodynamics of compositional multiphase mixtures

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In this work, we propose a new method to solve difficult nonlinear complementarity problems [3] arising in realistic applications.

Indeed, unified formulations [1],[4] using complementarity conditions have recently emerged as a promising way for the handling of the appearance and disappearance of phases in porous media multiphase compositional flows.

From a mathematical point of view and after discretization, this leads to systems of equations combining algebraic equations and nonlinear complementarity conditions. Such systems gives rise to major convergence difficulties for standard smooth or semi-smooth Newton-like methods.

This led us to design a new approach inspired by optimization interior point methods [2]. We propose a technique avoiding any parameter management while ensuring good theoretical convergence results validated by numerous numerical tests [6]. We present extensive numerical tests and several comparisons to classical methods [5].

Références

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