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An oscillation-free finite element method for two-phase fluid flow through poroelastic media

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The finite increment calculus technique (hereinafter called FIC) and the trapezoidal integration of storage terms (hereinafter called simple FEM) were applied to a finite element simulator for two-phase fluid flow through poroelastic media in order to avoid the unphysical oscillation appeared in the standard Galerkin finite element solutions with small time steps and coarse meshes in low-permeable zones.
Numerical tests showed that each one of FIC or simple FEM was not sufficient to avoid unphysical oscillation but the combination of both FIC and simple FEM techniques obtained oscillation-free solutions.
The developed numerical technique is expected to contribute geomechanical modeling of large scale CCS sites.