

Jacobian Tests

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1 Jacobian Tests

1.1 Fluid-mass time derivative

The following tests of the Jacobian are performed on the fluid-mass time derivative kernel (PorousFlowMassTimeDerivative).

1. single-phase, with a single component, with a van-Genuchten capillary pressure, constant bulk-modulus density and constant porosity.
2. single-phase, with 3 components, with a van-Genuchten capillary pressure, constant bulk-modulus density and constant porosity.
3. 2-phase PP formulation, with 2 components (that exist in both phases), with a van-Genuchten capillary pressure, constant bulk-modulus density for each phase and constant porosity.
4. 2-phase PP formulation, with 3 components (that exist in both phases), with a van-Genuchten capillary pressure, constant bulk-modulus density for each phase and constant porosity.

1.2 Fluid Advective Flux

The following tests of the Jacobian are performed on the fluid-mass advective flux kernel (PorousFlowAdvectiveFlux).

1. single-phase, with 1 component, constant viscosity, constant insitu-permeability, density with constant bulk modulus, Corey relative permeability, nonzero gravity, with van-Genuchten capillary pressure.
2. single-phase, with 3 components, constant viscosity, constant insitu-permeability, density with constant bulk modulus, Corey relative permeability, nonzero gravity, with van-Genuchten capillary pressure.
3. 2-phase (PP formulation), with 2 components (that exist in both phases), constant viscosity for each phase, constant insitu-permeability, density with constant bulk modulus for each phase, Corey relative permeability for each phase, nonzero gravity, with van-Genuchten capillary pressure.
4. 2-phase (PP formulation), with 3 components (that exist in both phases), constant viscosity for each phase, constant insitu-permeability, density with constant bulk modulus for each phase, Corey relative permeability for each phase, nonzero gravity, with van-Genuchten capillary pressure.