Edward W. Bolton: PUBLICATIONS:

Articles Submitted:


Published Refereed Articles:


**Articles in Preparation:**


**Book Reviews:**


o PONE-D-15-28617R1.

**Software Systems Developed:**

- KINFLOW: Reactive transport in a 2D, non-isothermal, heterogeneous, dynamic permeability, porous media with mineral reactions under kinetic control and numerous aqueous speciation reactions (see also KINFLOW1D below). The five mineral code was extended to include the 46 minerals, with accompanying thermodynamic and kinetic rate databases.

- META-KINFLOW: Similar to the above model, but with supercritical fluids (H2O, CO2) EOS at metamorphic conditions. 8 minerals used for computation of reactions of siliceous dolomites.

- DIG: Diffusion of isotopes and trace elements in grains during recrystallization (a moving boundary problem), exchanging with moving fluids in porous media.


- DIGmajorelem: Diffusion of major elements based on nonequilibrium thermodynamics in a 4 mineral set during rapid uplift of kimberlites with applications to thermobarometry (a collaboration with Alex Andrews and Zhengrong Wang).

- KINFLOW1D: Similar to KINFLOW, but for 1D, with 46 minerals under kinetic control, 27 aqueous phase equilibrium reactions, 64 aqueous species, and 2 gases (O2, CO2). A 0D version of this model has been implemented for comparison to the geochemical experiments. This models has recently been linked with a 1D geomechanical compaction model, in collaboration with Zhengyu Cai and David Bercovici. In addition to the viscous solid end-member geomechanical compaction model, a poroelastic solid model has been coded.
• KINFLOWCO2SEQ: Reactive transport in a 2D, non-isothermal, heterogeneous, dynamic permeability, porous media with mineral reactions under kinetic control and numerous aqueous speciation reactions. The code above was extended to 2D and to include liquid and vapor phases, separate EOS for CO$_2$-brine phases, with applications to subsurface carbon sequestration.

• CVS 5.0, 6.0: Compositional Variation Software for hydrocarbon reservoir evolution in a two-phase fluid based on non-equilibrium thermodynamics. Prepared in collaboration with A. Firoozabadi. Available to members of the Reservoir Engineering Research Institute. Software package included Bolton’s modification of the nearly 17,000 lines of code, manuals (1 CVS5 release, 3 CVS6 releases), example input files and case studies with accompanying figures and descriptions, hydrocarbon property databases, instructions for plotting via R and Splus. Bolton implemented dynamic thermal evolution and convection, tilt of the reservoir layers, heterogeneities in tortuosity, separate barycentric reference frames for liquid and vapor phases, multiple injection and extraction wells.


• COLONYCODE: Fluid flow and nutrient circulation driven by an arbitrary number of polyps (as pumps) in an arbitrary network of elastic tubes as a model for the circulation system of the hydrozoan Podocoryne carnea.

• Double diffusive convection (heat and salt) for the investigation of salt fingering and cabling and their contribution to vertical heat and mass transport in the ocean with thermobaric effects. This project is a collaboration with Prof. George Veronis.

**Reports of Significance:**
