

Flow and Transport in Porous Media (2017)

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Lecture Structure

1 Single phase flow in porous media.

- Darcy's law. Hydraulic head. Hydraulic conductivity and permeability.
- Conservation laws and governing equations.
- Energy conservation.
- Model simplifications. Analytical solutions. Reduction of dimensionality.
- Numerical methods.

2 Two-phase flow in porous media.

- Two-phase flow.
- Capillary pressure/Hysteresis.
- Richards' equation.
- Non-standard models.
- Buckley-Leverett solution.
- Numerical methods.

3 Solute transport in porous media.

- One-component transport.
- Multicomponent reactive transport.
- Numerical methods.

4 Flow in deformable porous media.

- The Biot equations.
- Numerical solvers for the Biot model.

I will mainly follow the book [7]. The references below are covering the rest.

References

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- [13] F. A. Radu, *Mixed finite element discretization of Richards' equation: error analysis and application to realistic infiltration problems*, PhD Thesis, University of Erlangen, Germany (2004).
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