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Zhangxin John Chen* (zchen@mail.smu.edu), Center for Scientific Computation, Box 750156, Dallas, TX 75275-0156. *Control Volume Finite Element Methods and Their Applications to Multiphase Flows in Porous Media.*

This talk will give a general overview of control volume finite element methods and their applications to multiphase flows in porous media. An error analysis of these methods and their local mass conservation and flux continuity properties will be given. Numerical experiments to show their ability to handle faults and slanted wells and their applicability to arbitrarily shaped grids will be presented. Their applications to black-oil, compositional, and thermal models in petroleum reservoirs will be discussed. (Received September 16, 2005)