1023-65-915 **Koffi B. Fadimba*** (Koffif@usca.edu), University of South Carolina Aiken, 471 University Parkway, Aiken, SC 29801. *A Linearization of a Backward Euler Scheme for the Saturation Equation: A Regularity Result.* Preliminary report.

We consider the saturation equation

$$\frac{\partial S}{\partial t} + \nabla \cdot (f(S)\mathbf{u}) - \nabla \cdot (k(S)\nabla S) = 0$$

, modeling two-phase immiscible flow through a pourous medium. A linearization of the usually proposed backward Euler Scheme is obtained through first order Taylor expansions of the nonlinear functions internvening after a regularization of the degenerate equation ($k(0) = k(1) = 0$). In preparation for error estimates for the linear scheme obtained, regularity results are established. (Received September 22, 2006)