Carol Woodward

An Accelerated Picard Method for Nonlinear Systems Related to Variably Saturated Flow

Lawrence Livermore National Laboratory
P O Box 808
L-561
Livermore
CA 94551
woodward6@llnl.gov
P. Aaron Lott
Homer Walker
Ulrike Yang

In this talk, we investigate the effectiveness of the Anderson acceleration method applied to modified Picard iteration for nonlinear problems arising in variably saturated flow modeling. While many authors have studied the relative merits of Newton's method and modified Picard iteration in this context, the combination of Anderson acceleration and modified Picard iteration has not been investigated for these problems until recently. Since the modified Picard iteration can be slow to converge, we investigate the use of Anderson acceleration to provide faster convergence while maintaining the robustness and lower memory requirements of the modified Picard iteration relative to Newton's method. Results indicate that Anderson acceleration signi ficantly improves not only convergence speed but also robustness of modified Picard iteration and can often provide faster solutions than Newton's method without the need for derivative computations.