1015-86-107 **Darko Volkov*** (darko@wpi.edu), 100 institute road, worcester, MA 01609, and **Ioan Ionescu**.

An inverse problem for the recovery of active faults from surface observations.

We discuss in this paper the possibility of detecting slow slip events (such as silent earthquakes, or earthquake nucleation phases) in the vicinity of geological faults, and the possible localization of those faults from GPS observations. A nonlinear eigenvalue problem modeling the slow evolution of the slip is stated as a direct problem. The recovery of an active fault from surface observations is formulated as the related inverse problem. We perform an asymptotic analysis of the solution with respect to the depth of the fault. We start from an integral formulation for the direct problem. We prove that the differences between the eigenvalues and eigenfunctions attached to the half space problem and those attached to the free space problem, is of the order of d^{-2}, where d is a depth parameter. An asymptotic formula for the observed surface displacement, with a remainder of same order is then derived. From that formula, we infer two inversion techniques for the recovery of faults from surface observations. The recovered information contains only the depth of the fault and the "normalized seismic moment", which is related to the fault shape. We test the two inversion methods for line segment faults in numerical simulations. (Received January 30, 2006)