

## Magnetic field generation by electrokinetic coupling in 3-D resistivity structures

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In order to evaluate the effects of complex 3-D resistivity structures on the generation of magnetic field through electrokinetic coupling, numerical simulations were performed. The present approach simulates magnetic fields by a three-step process. First, it calculates the drag current distribution from the results of fluid flow simulations. Second, it calculates the electric potential and conduction current distributions in a 3-D finite-difference grid. Finally, it calculates the magnetic field by applying the Biot-Savart law to the distributions of drag and conduction currents. The effects of inhomogeneous and anisotropic resistivity structures on the enhancement of magnetic signals at the earth's surface, and its implications for earthquake-related magnetic anomalies are discussed.