The affection of the scattering effect on the coseismic magnetic signals

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The coseismic electromagnetic (EM) signals associated with natural earthquakes have been reported in numerous field observations. Several numerical simulation works based on the electrokinetic effect have successfully explained some characteristics of the observed coseismic EM signals. However, there is one problem on the coseismic magnetic signals. When the receiver is nearby the ground surface, the simulated coseismic magnetic signals will show up as late as the arrival of S waves. That is obviously different from field observations, in which coseismic magnetic signals show up at the arrival of P waves. To explain this difference, we conduct theoretical analysis on the reflection and transmission coefficients at the ground surface, which implies the scattering effect probably has a significant contribution to the coseismic magnetic signal observed before the arrival of S waves. Thereafter, further numerical simulations are carried out to estimate the affection of the scattering effect on the coseismic magnetic signals.