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Effect of pore pressure on the effective friction coefficient during the calculation of Coulomb failure stress

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Coulomb failure stress (CFS), playing an important role in earthquake triggering mechanism and investigating fault interaction, is a reliable tool to analyze where will be more dangerous or safer after an earthquake or other activities. Moreover, the effective friction coefficient is a key factor during the calculation of changes of CFS when considering the effect of pore pressure. Unfortunately, it is commonly regarded the effective friction coefficient as a constant and less than intrinsic friction coefficient during the calculation of changes of CFS. In fact, the effective friction coefficient is different from the original data because of stress states has been changed, especially after the occurrence of big earthquake. According to the expression of CFS, the effective friction coefficient is not only depend on the normal stress changes but also closely connect to the pore pressure changes, which including both diffusion pore pressure changes and instaneous pore pressure changes at the same time. For both diffusion pore pressure and instaneous pore pressure diffuse with time, the effective friction coefficient also varies with time. Leaving aside the chemical actions between rock and water, we construct different finite element co-seismic models to estimate the effects of pore pressure on the effective friction coefficient for different types of faults. Therefore, we could attain the diffusion process of CFS with time, and to discuss the relation between the dynamic CFS and distribution of aftershocks.