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Are stress distributions along faults the signature of asperity squeeze?

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We analyze the spatial fluctuations of the stress field along the Nojima fault, Japan where unique estimates of the absolute stress field have been obtained. We speculate that the persistent pattern that exists when comparing ante- and post-earthquake stress distributions, can be described in terms of scaling invariance (self-affine scaling). We used a wavelet spectrum method to obtain the roughness exponent of the shear stress distribution ($H_\tau =-0.2$) and of the slip distribution ($H_u =0.8$). We propose a possible mechanism for the origin of these spatial correlations. Indeed, we compare the measured stress field to that obtained from a boundary element model that elastically squeezes realistic fault asperities. We base our model on the morphology of two measured fault planes at laboratory scales. Consequently, fluctuations of the stress field along the fault could be dominated by quenched fault properties rather than dynamical stress fluctuations produced during the earthquake.