# #425 Interface cracks under dynamic loading: cracks' closure and friction

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*Cracks* *Contact interaction* *BIEs*

**Abstract** The systems of linear cracks between two dissimilar elastic isotropic half-spaces under dynamic (harmonic and impact) loading were considered taking effects of the cracks' faces closure and friction into account.

The system of boundary integral equations for displacements and tractions at the interface was derived from the dynamic Somigliana identity, and in order to take the crack faces' closure into account we assumed that the contact satisfies the Signorini constraints and the Coulomb friction law. The normal and tangential components of the external loading, the displacement discontinuity and the tractions at the interface were approximated by the exponential Fourier time series. For every Fourier coefficient number the appropriate system of linear algebraic equations was obtained from the boundary integral equations and solved numerically, so the displacements and tractions in the form of Fourier exponential series with a finite number of the members were found. During the numerical solution divergent integrals of various order (hypersingular, singular and weakly singular) were regularized and calculated.

The problem was solved numerically using the iterative process – the solution changed until the distribution of physical values which satisfies the contact constraints had been found. The numerical convergence of the method with respect to the number of the Fourier coefficients and mesh size was also analysed.

The distributions of the displacements and tractions were obtained and the dynamic stress intensity factors were computed as functions of the parameters of the incident loading and properties of the bi-material. The results were compared with those obtained neglecting the cracks' closure. The effects of material properties and values of the friction coefficient on the distribution of stress intensity factors (opening and shear modes) were presented and analysed. Special attention was paid to the effects of the mutual location of the cracks.