

PhD position: Modeling rough surface contact and friction

The general aim of this project is to gain a better understanding of contact and friction behavior of rough surfaces with (sub-)micron scale asperities.

There is increasing experimental evidence to suggest that classical theories do not accurately model rough surface contact. The discrepancy between classical predictions and experimental findings is primarily a consequence of size effects in plasticity. When the size of the contacts is comparable to the dislocation source spacing, the discrete nature of plastic flow cannot be neglected. Therefore this research focuses on the discrete nature of plastic flow by using discrete dislocation plasticity simulations. These simulations will enable us to compute the stress state and the deformation under and in the vicinity of the contacts.

Prediction of asperity deformation during flattening is crucial in determining the true contact area as well as the friction stress.

PhD position: Modeling metal nanoimprinting

This project deals with a new nanotechnology, metal nanoimprinting, to create nanoshapes in thin metal layers for electronic applications. The nanoshapes are obtained by transferring the pattern on a rigid punch onto the metal specimen.

The objective of the project is to computationally explore the conditions for creating nanopatterns with this new technique, that involves plastic deformation of the metal. To this end, the candidate will set up and carry out molecular dynamics and discrete dislocation plasticity simulations in order to monitor deformation of the metal by computing dislocation nucleation and glide.

Requirements

We seek candidates with a master degree in mechanical engineering, physics, materials science or a related field. A good computational background is preferred and an interest in modeling the mechanical behavior of materials is required. Good oral and written communication skills in the English language are necessary.

Conditions of employment

Estimated maximum salary per month: eur 2000 - 2500

Employment basis: Temporary for specified period

Duration of the contract: 4 years

To apply please send a detailed CV (including the list of grades obtained during your Master program), a statement of purpose and the contact information of at least two referees to Lucia Nicola: L.Nicola@tudelft.nl.