

University of Groningen

## Size-dependent plasticity in contact/friction: from discrete dislocation dynamics inside an asperity to statistical summation over asperities

Song, Hengxu

**IMPORTANT NOTE:** You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

*Document Version*

Publisher's PDF, also known as Version of record

*Publication date:*

2016

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Song, H. (2016). *Size-dependent plasticity in contact/friction: from discrete dislocation dynamics inside an asperity to statistical summation over asperities*. Rijksuniversiteit Groningen.

### Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

### Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

*Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.*

# Propositions

accompanying the dissertation

## **SIZE-DEPENDENT PLASTICITY IN CONTACT/FRICTION: FROM DISCRETE DISLOCATION DYNAMICS INSIDE AN ASPERITY TO STATISTICAL SUMMATION OVER ASPERITIES**

by

**Hengxu SONG**

1. When dislocation sources in annealed pillars under compression are stronger than obstacles, plastic deformation is source controlled and there is no size effect of the yield strength. When obstacles are stronger than dislocation sources, plastic deformation is controlled by dislocation depinning and yield becomes size dependent. (Chapter 3)
2. The pressure distribution on a rough surface under contact strongly depends on the plastic properties of the material. However, when the material remains elastic, the distribution is universal. (Chapter 4)
3. The Greenwood-Williamson (GW) statistical model is able to provide a similar size dependent behavior as full detailed FEM results when the estimate of the surface GW parameters is representative of the simulated surface asperities. (Chapter 5)
4. The onset of sliding between two surfaces can be caused by decohesion, by plastic deformation, or by both. Not only the length scale influences the real mechanism of the onset of sliding, but also the external loading rate. (Chapter 6)
5. Due to size dependent plasticity, the force to plastically deform different sizes of self-similar asperities is size independent. (Chapter 7)
6. You can already know in primary school who of your friends will live longer by doing an IQ test.