

Accepted Manuscript

The generalized Tabor parameter for adhesive rough contacts near complete contact

Michele Ciavarella, Yang Xu, Robert L. Jackson

PII: S0022-5096(17)31079-7
DOI: <https://doi.org/10.1016/j.jmps.2018.08.011>
Reference: MPS 3416



To appear in: *Journal of the Mechanics and Physics of Solids*

Received date: 30 November 2017
Revised date: 24 July 2018
Accepted date: 13 August 2018

Please cite this article as: Michele Ciavarella, Yang Xu, Robert L. Jackson, The generalized Tabor parameter for adhesive rough contacts near complete contact, *Journal of the Mechanics and Physics of Solids* (2018), doi: <https://doi.org/10.1016/j.jmps.2018.08.011>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

The generalized Tabor parameter for adhesive rough contacts near complete contact

Michele Ciavarella (1), Yang Xu (2), Robert L. Jackson (2)

1) *Politecnico di BARI. Center of Excellence in Computational Mechanics. Viale Gentile 182, 70126 Bari. Mciava@poliba.it*

2) *Mechanical Engineering Department, Auburn University, AL 36849, USA*

Abstract

Recently, the first author has obtained a model for adhesive contact near full contact under the JKR assumptions. The model shows, in the common case of low fractal dimensions, an ‘unbounded’ adhesion enhancement when larger and larger upper “truncation wavenumber” is considered in the spectrum of roughness, i.e. when we increase “magnification”. Here, using a more general Maugis-Dugdale model, we show that a generalized multiscale Tabor parameter can be defined which shows a transition to a non-hysteretic regime, dependent on the root-mean-square (rms) slope of the surface. The contact area returns in the “fractal limit” to the adhesionless one. Two examples of rough surfaces from the literature are considered to show the full dependence on magnification of the adhesive solution. The choice of the truncation of the spectrum remains fundamentally arbitrary.

Keywords: Roughness, Adhesion, hysteresis, Gaussian distribution

1. Introduction

Adhesion between randomly rough elastic bodies is a complicated problem, despite the main conclusion of experiments (Fuller & Tabor, 1975) is that amplitude of roughness is the primary parameter dominating the problem. As we realize that surface roughness is multiscale, many physical quantities seem to depend (according to some models) on short wavelength cutoffs determining slopes, curvatures and even higher order spectral moments, which are quantities not converging if one includes more and more details and scales

Download English Version:

<https://daneshyari.com/en/article/10152437>

Download Persian Version:

<https://daneshyari.com/article/10152437>

[Daneshyari.com](https://daneshyari.com)