

Micromechanical Model of Rough Contact Between Rock Blocks with Application to Wave Propagation

Anil MISRA and Orestes MARANGOS

Department of Civil Engineering,
University of Kansas, Lawrence, KS, USA
e-mail: amisra@ku.edu

Abstract

The relationship between effective stiffness of rough contacts of rock blocks and transmission of plane waves is well known. Effective stiffness of a rough contact may be related to the force-deformation behavior of the asperity contacts and the statistical description of rock joint surface topography through micromechanical methods. In this paper, a micromechanical methodology for computing the overall rock contact effective stiffness is utilized along with the imperfectly bonded interface model to investigate how transmitted and reflected wave amplitudes are affected by the incident wave frequency, rock joint closure and the existing rock joint normal stress conditions. As a result, expressions for reflected and transmitted wave amplitudes as well as group time delay of the wave-packets are obtained and parametrically evaluated.

Key words: rough contact, micromechanics, effective stiffness, rock joint, wave propagation.