

SIMPLE MODEL FOR ENERGY
AND FORCE CHARACTERISTICS
OF METALLIC NANOCONTACTS

*V.V. Pogosov^{1,2}, V.P. Kurbatsky¹, D.P. Kotlyarov¹,
A. Kiejna²*

¹Department of Microelectronics,
Zaporizhzhya National Technical University
(Zaporizhzhya 69064, Ukraine;
e-mail: vpogosov@zstu.edu.ua),

²Institute of Experimental Physics,
University of Wrocław
(Wrocław 50-204, Poland)

S u m m a r y

The quantum size oscillations of the energetic properties and the elongation force of gold slabs and wires isolated and in a contact with electrodes are calculated in a free-electron model. A simple relation between the Fermi energy and the square-potential-well depth is used and tested for low-dimensional systems. It is shown that considering the electron subsystem of a slab (or wire) in a contact as an open one, the contact acts like a sort of electron pump which sucks or pumps out electrons from the sample. The effect of the contact potential difference (CPD) on oscillations of the elastic force is considered. The calculated amplitudes of the force oscillations are in a qualitative agreement with those observed experimentally.