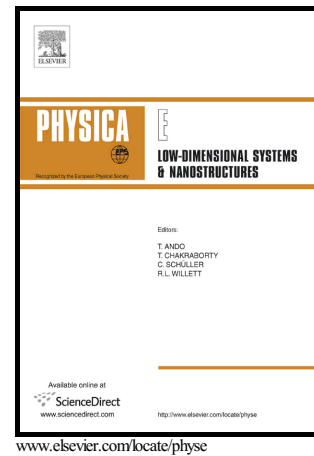


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# Some peculiarities for grazing incidence neutron diffraction from 3D near-surface nanostructures

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Neutron diffraction at grazing incidence was simulated for the regularly ordered nanostructures on the surface and in the near-surface volume of a homogeneous matrix. Silicon was used as a matrix material and nanoparticles consisting of gold or nickel. This allowed obtaining a good scattering contrast between the matrix and nanoparticles and, as a result, high contrast diffraction patterns. It is shown that the modified kinematic approximation which takes into account the refraction of a neutron wave at the interface makes it possible to obtain a reasonable agreement with the available experimental data. In addition, it was demonstrated that in contrast to the traditional diffraction on point-like scattering centers, some unusual systematic absences could be observed due to the experiment geometric conditions and the finite geometric sizes of the nanoparticles. The results demonstrate that modified kinematic approximation can be successfully used to model non-specular neutron scattering from near-surface nanostructures and thereby facilitate the interpretation of experimental results.

Keywords: kinematic approximation; grazing incidence diffraction; neutron scattering;

## 1. Introduction

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