

Structural studies of the ancient Iranian bowl by means of the neutron radiography and tomography methods

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One of the most important tasks of archeology and other history-related sciences is the comprehensive study of cultural heritage items. The results of these studies have a significant application value, because they provide a way to penetrate into the far past and allow us to understand the formation and evolution of civilizations and ethnic groups. One of the non-destructive methods is neutron radiography and tomography. The fundamental difference in the nature of neutron interactions with matter compared to X-rays provides additional benefits to neutron methods, including sensitivity to light elements, a notable difference in contrast between different metals, and high penetration ability. The non-destructive character of the neutron radiography and tomography method has prompted the rising interest in studying rare archaeological items and museum rarities, especially metallic artifacts, weapons and ancient jewelry.

My talk presents the visual 3D structural volume data of the studied cultural heritage object, as well as the results of the corresponding analysis. The attenuation of the neutron beam corresponds to the scattering and absorption losses inside the matter. The neutron attenuation coefficients for a neutron beam of a glue material are larger in comparison to the relevant parameters for the glass. Due to this fact, it is quite easy to recover the hidden glue tracks in the glass bowl. Morphological calculations based on the experimental tomography data were used to analyze the spatial arrangement of different components of the studied bowl.

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