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On similarity of X-ray diffraction patterns formed in a 3-block defocused interferometer and a bi-crystal system of narrow air gap

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In this paper, the results of the studies of fine structures of X-ray diffraction patterns formed in the X-ray 3block defocused (violated ideal geometry) interferometers, as well as a new method to record these structures, are presented. To implement this method, a monolithic 4-block X-ray diffraction system is proposed and successfully applied, in which the first 3 blocks are thin and set up a 3-block interferometer of a violated ideal geometry, while the additional thick 4th block is in a reflection position. It is shown that fine structures of X-ray interference patterns obtained from 3-block interferometers of violated ideal geometry are also detected when the splitter and mirror blocks are thin and the analyzer is thick. The formation of interference patterns as families of parallel stripes (lines) in a plane perpendicular to the diffraction vector is experimentally proved for X-ray 3-block interferometers of nonideal geometry. The additional 4th thick block is revealed to be responsible only for the increase of the pattern linear size in the scattering plane without changing the pattern qualitatively and introducing new information into it. It is experimentally shown that fine structures of X-ray diffraction patterns are also revealed in bi-crystal systems with a non-diffracting zone (narrow air gap), which is also confirmed by the use of an additional 3rd thick block. It also proved the identity of fine structures of X-ray diffraction patterns observed in a 3-block defocused interferometer and a bi-crystal system of narrow air gap.

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