Pseudopotential Calculations of Lattice Distortions around Impurities in Simple Metals

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Lattice Distortions by Copper Atoms in an Aluminum Lattice

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With the method of elastic diffuse scattering of neutrons the strain field produced by copper atoms dissolved in aluminum was investigated. Measurements were performed at 800 K and at room temperature on a single crystal containing 0.8 at.% of copper. A time-of-flight technique was applied to discriminate between elastically and inelastically scattered neutrons. The general features of the scattering pattern recorded in the high-temperature run are found to be well explained by a theoretical approach based on the assumption of isotropic forces acting on nearest neighbours only. Possible refinements of the model are discussed. At room temperature the pattern shows the characteristic features resulting from the formation of Guinier–Preston zones.