A CONTRIBUTION TO THE THEORY OF THE TRIPLE CRYSTAL DIFFRACTOMETER

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The first part of the paper gives a general equation for triple-crystal arrangement with perfect crystals on the assumption that the third crystal is rotated. It is shown that in the case of perfect crystals the shape of the reflection curve is practically independent of the vertical divergence. The case of mosaic crystals is also solved and the possibility of rotation by other than the third crystal is considered. A method is proposed for investigating the imperfection of a crystal which is different from methods used up to now. The paper is supplemented by some experimental results.

INTRODUCTION

In 1937 Du Mond [1] dealt with triple-crystal (and multi-crystal) arrangement and gave a very elegant graphical method by means of which he analyzed different cases. We refer here to the original paper but it would be well to emphasize the basic assumptions: Du Mond represents diffraction on a crystal as a function of two independent variables, \( \vartheta \) and \( \lambda \), in Cartezian coordinates.

(more graphically like a transparency graph). Diffraction on multi-crystal arrangement is then represented by superposing the graphs so that the direction of the \( \lambda \) axis is preserved and the direction of the \( \theta \) axis is either the same or opposite according to whether the next crystal is on the opposite or same side of the radiation to the previous crystal, and the origins are at a distance from each other by an inclination \( \phi \) of one crystal from the other (Fig. 1).

![Fig. 1](image)

**Fig. 1.**

This graphic representation assumes the fulfilling of two conditions:

1a) The influence of the divergence is negligible.

1b) The angle of incidence and of reflection from the crystal planes are equal.

The second condition in particular is especially important and if not fulfilled the graphic method fails. This graphic aid helped Renninger [2] in 1938 to...