physics (86 pp.) and 5. *Structure analysis of crystals* (55 pp.). The popularity of 'Kleber' is demonstrated by its many editions; probably because it contains a rather comprehensive account of classical crystallography together with many practical applications. The excellent printing and the very reasonable price have to be mentioned in particular.

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Fourier optics: an introduction. By E. G. STEWARD. Pp. 185. Chichester: Ellis Horwood Ltd (John Wiley & Sons), 1983. Price £15.00 (hard cover) £7.95, US $13.75 (paper).

This book bears an obvious similarity to the well-known text by Lipson & Taylor. The author suggests that the text is suitable for students at all undergraduate levels and for 'lecturers'. In fact, it attempts to present modern optical techniques for image processing in a reasonably elementary way.

Numerous references to historical papers abound and, in many cases, the nature of the theories or experiments to which they refer are discussed. All of this is to the good and, in general, is well done. What is less satisfactory is the very variable level of presentation. Quite sophisticated mathematical results such as the Wiener–Khinchin theorem are derived in a non-rigorous manner, whereas such standard optical techniques as the Fresnel integrals and the associated Cornu spiral are totally omitted.

The first section discusses coherence, image formation and interference. The material is conventional and vector methods are used where possible. A good feature of this chapter is the very detailed discussion of the experimental conditions needed to obtain good image contrast in interferometric experiments.

Chapter two considers Fraunhofer diffraction; slits, circular apertures, gratings and crystal diffraction are all examined. This leads naturally to a discussion of Fourier series and periodic structures in the third chapter.

The fourth chapter describes Fourier transforms, convolution and correlation, probably the most important cornerstones of modern optical instrumentation. The treatment is heuristic and elementary, often to the extent of inaccuracy. The introduction of the Dirac delta function on p. 68 is particularly objectionable.

The most interesting chapters are five on *Optical image processing* and six on *Interferometry and radiation sources.* As might be expected, holographic techniques receive detailed analysis as do fairly recent developments in microscopic image contrast enhancement. Here again the treatment is sloppy in places, for example on p. 93 where numerical aperture is misrepresented. The discussions of the Michelson stellar interferometer and of recent long base interferometric techniques are timely and will interest students.

There are five Appendices which describe elementary electromagnetic wave theory, Bragg reflection and elementary trigonometrcical formulae. There is also a useful bibliography.

The book is reasonably well written but is considerably overpriced. It may be of use in undergraduate physics courses but cannot be recommended for potential crystallographers.

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Yield, flow and fracture of polycrystals. Edited by T. N. BAKER. Pp. xiii+361. Barking, England: Applied Science Publishers, 1983. Price £42.00.

This book is an edited collection of 15 papers given at a meeting (September 1982) to honour the achievement of Professor H. J. Petch. The authors are mostly British, with a few from the USA, Canada and Denmark. The book consists of three parts: Part I deals with yield and flow, Part II with fracture, and Part III with the application of Hall–Petch and Cottrell–Petch relations to the mechanical properties of engineering materials. The papers are concerned almost exclusively with metals and alloys, particularly with steels.

The first paper in Part I is an instructive introduction to the Hall–Petch relation, and discusses the dislocation pile-up theory as the basis of the relation. It is explained how the relation, originally developed to explain the yield-point behaviour of α-iron polycrystals in terms of grain size, is applicable to the yield and flow of a variety of metals and alloys, including those with f.c.c. and h.c.p. structures. The second paper deals with experimental results on the plastic deformation of polycrystalline aluminium. The third and fourth papers discuss the plasticity of phase mixtures and porous materials, respectively, from essentially macroscopic standpoints.

In Part II, cleavage fracture and toughness of structural steels in relation to the Cottrell–Petch equation are discussed first. The plastic work of fracture is discussed in detail. Macroscopic fracture toughness values are shown to be related to the micromechanisms of cleavage fracture in the crack-tip region. The second paper describes the crack branching in the fracture of alumina. Conditions for crack branching are proposed. In the third paper, Cottrell discusses a problem involved in the brittle fracture from pile-ups in polycrystalline iron, *i.e.* the effective surface energy. The last paper in this part deals with the stability of fracture from a macroscopic standpoint.

Seven papers are given in Part III. In the first, the effect of grain size on the mechanical properties of ferrous materials is described. The authors give some comments on the Petch-type relation; these comments are important for the further clarification of the physical basis of the Petch-type relation and the extension of its application to engineering materials. The latter half of this paper describes the experimental formula of mechanical properties in terms of grain size and solute concentrations. Other papers in