Foreword

The work reported here represents the results and the state of understanding which had been achieved in December, 1966. Since that time some further progress has been made, and it will be described in later reports of this series. Particular attention is drawn to the approximate temperature calculation described in Section 4.1. The basis of this approximation is now thought to be unsound, so some skepticism should be maintained concerning temperature effects reported. Fortunately these are few and slight, and the general conclusions of the report are not affected by possible errors here.

A major shortcoming of the theory, but one which is very hard to evaluate, is the complete reliance on equilibrium thermodynamics to describe the static behavior. It is quite likely that metallurgical considerations govern the true progress of the α-ϵ transition in iron; consequently the static reference states to which dynamic effects are referred may be metastable and very different from the thermodynamic states. This is suggested by recent static pressure measurements by Bassett and co-workers (J. Appl. Phys., Jan. 1967) and by shock de-magnetization experiments by R. A. Graham of Sandia Corporation (private communication). Satisfactory metallurgical models for such processes are not presently available; it is hoped that shock wave measurements will help to stimulate the development of such models.

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