

FIG. 3. Generalized susceptibility function for dysprosium in  $\Gamma A \Gamma$  direction at 0 and 20 kbar of hydrostatic pressure.

highly satisfactory. The energy bands and the density of states under pressure are not plotted because they closely resemble their zero-pressure counterparts.

In conclusion, we feel that the pressure dependence of the magnetic ordering of heavy rare earths can be explained on the basis of the pressure shift of the energy bands. Conversely, the good results of the present calculation lend further support to the contention that the initial magnetic ordering in these metals is mainly determined by the energy band structure through the indirect exchange mechanism.

We wish to thank Dr. T. L. Loucks for suggesting the problem and for his innumerable advices in setting up the program. We would also like to acknowledge Dr. E. S. Fisher for information about the elastic constants of rare earths.

\*Work performed in the Ames Laboratory of the U. S. Atomic Energy Commission. Contribution No. 2690.

†Present address: North American-Rockwell Corporation, Tulsa, Okla.

<sup>1</sup>L. Patrick, Phys. Rev. 93, 384 (1954).

<sup>2</sup>D. B. McWhan and A. L. Stevens, Phys. Rev. <u>139</u>, A682 (1965).

<sup>3</sup>D. Bloch and R. Pauthenet, in *Proceedings of the International Conference on Magnetism*, *Nottingham*, 1964 (The Institute of Physics and The Physical Society, London, 1965), p. 255.

<sup>4</sup>L. B. Robinson, S. I. Tan, and K. F. Sterett, Phys. Rev. <u>141</u>, 548 (1966).

<sup>5</sup>I. G. Austin and P. K. Misra, Phil. Mag. <u>15</u>, 529 (1967).

<sup>6</sup>H. Umebayashi, G. Shirane, B. C. Frazer, and W. B. Daniels, Phys. Rev. <u>165</u>, 688 (1968).

<sup>7</sup>S. C. Keeton and T. L. Loucks, Phys. Rev. <u>168</u>,

672 (1968).

<sup>8</sup>W. E. Evenson and S. H. Liu, Phys. Rev. Letters <u>21</u>, 432 (1968).

<sup>9</sup>W. E. Evenson and S. H. Liu, Phys. Rev. <u>178</u>, 783

<sup>10</sup>T. L. Loucks, Phys. Rev. <u>139</u>, 231 (1965). See also, T. Loucks, Augmented Plane Wave Method (Benjamin, New York, 1967).

<sup>11</sup>E. S. Fisher and D. Dever, paper presented at the Sixth Rare-Earth Research Conference, 1967, Conference Preprints No. CONF-670502 (1967), p. 522 (unpublished).

12E. S. Fisher (private communication).

<sup>13</sup>J. C. Jamieson, Science <u>145</u>, 572 (1964).

<sup>14</sup>E. S. Fisher and D. Dever, Trans. Met. Soc. AIME 239, 48 (1967).

<sup>15</sup>S. H. Liu, Phys. Rev. <u>127</u>, 1889 (1962).