I. INTRODUCTION

Simple local pseudopotential models have been used to calculate the binding energy and compressibility of several metals,[1-3] and reasonably good agreement with experiment has been obtained. In the present paper, we analyse Martinson's[4] ultrasonic data for sodium, and calculate the bulk modulus and its first and second pressure derivatives at zero pressure. The method proposed by Ashcroft and Langreth [2] has been used to derive the theoretical values of the above derivatives at absolute zero degree. The parameter r_c is obtained from the extrapolated experimental lattice constant a_o in one case and from the extrapolated experimental bulk modulus B_o in the second. The results are then compared with experimental values. In addition, results are also shown which include an ion overlap repulsion term.

II. ANALYSIS OF DATA

We have used Martinson's notation $\left[\frac{\tau(o)}{\tau(p)}\right]^2 = 1+a_1P+a_2P^2$ to obtain the following relations:

$$\left(\frac{\partial C^S}{\partial P}\right)_{\substack{T \\ P=o}} = C_o^S \left[\frac{1}{3B_o^T} + a_1\right] \tag{1}$$

$$\left(\frac{\partial^2 C^S}{\partial P^2}\right)_{\substack{T \\ P=o}} = C_o^S \left[\frac{1-3B_o^{T'}}{9\,B_o^{T^2}} + 2a_2 + \frac{2a_1}{3B_o^T}\right] \tag{2}$$