

Mechanical and Thermophysical Properties of Molybdenum: An Ultrasonic Study

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ABSTRACT

The paper deals with the theoretical calculation of mechanical, thermal and ultrasonic properties of Molybdenum along crystallographic direction $\langle 100 \rangle$. The higher order elastic constants have been calculated using Coulomb and Born-Mayer potential up to second nearest neighbour at 273.2K, 298.2K and 373.2K. The ultrasonic velocity, Debye average velocity, thermal relaxation time and acoustic coupling constant are calculated using higher order elastic constants and other related parameters. Ultrasonic attenuation due to phonon-phonon interaction and thermoelastic loss has been evaluated at these temperatures for longitudinal and shear waves along $\langle 100 \rangle$ direction. The obtained results are discussed in correlation with available results on these properties for the chosen material Mo.

Key words: Elastic constants, ultrasonic velocity, thermal conductivity, ultrasonic attenuation