SEMICONDUCTOR THERMOELASTIC SOLID SPHERE UNDER MOISTURE AND THERMAL DIFFUSIVITY

Dedicated to Dr. Dan Tiba on the occasion of his 70th anniversary

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Abstract. This paper has introduced a novel approach to simulate the thermal and moisture diffusivity in a semiconducting solid sphere, based on two-temperature theory of thermoelasticity. By incorporating two-temperature theory, it accounts for the interplay between the temperature and stress, providing a more accurate representation of the system's behavior. The research focuses on the behavior of the sphere when it is subjected to a laser pulse that induces varying heat flux on its boundary surface. By utilizing the Laplace transform technique, the mathematical model is solved in the transformed domain to meet the intended objective. The mathematical model is numerically inverted to obtain a comprehensive understanding of the physical parameters in the physical domain. A graphic representation of various parameters under the effect of moisture diffusivity at two different temperatures are generated using the MATLAB software. The model offers a comprehensive approach to accurately represent thermal and moisture diffusivities of the solid sphere, enabling a deeper comprehension of the various phenomena observed in a wide range of the semiconductor devices. By utilizing this model, the engineers and designers can enhance their ability to effectively design these devices, ensuring optimal performance and functionality.

Keywords: Moisture diffusivity, Thermal diffusivity, Semiconducting sphere, Two temperature.

DOI **10.56082/annalsarsciphyschem.2024.1.27**

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