

# DEVELOPMENT OF A COMPUTER SOFTWARE FOR POLYMER COMPOSITE MECHANICAL PROPERTIES ANALYSIS

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This research investigates the development of a software application designed for the analysis of polymer composites and the estimation of their mechanical properties, specifically the elastic modulus and tensile strength. In response to the need for accessible and efficient computer applications in composite analysis, this study focuses on developing a software which employs scanning electron microscopy (SEM) micrographs of the composites to extract relevant data. The software utilizes image processing techniques to accurately identify spherical particles within the composite and offers estimations for the elastic and shear modulus as well as tensile strength values. It is particularly suitable for the analysis of composites consisting of randomly oriented spherical particles, as well as those reinforced with short fibers.

The mathematical models employed in the software, derived from previous calculations, allow for the estimation of the elastic modulus, shear modulus, and Poisson's ratio of the composite. The software also provides additional features to enhance its reliability and user experience. Furthermore, to ensure accuracy and reliability, the software underwent validation by comparing its predictions against literature-based real values.

The developed software application addresses the need for accessible and efficient computer applications in the field of mechanical data extraction from polymer composites. It offers a user-friendly interface and advanced algorithms for analyzing SEM micrographs and extracting key mechanical properties quickly and efficiently. The software provides researchers and engineers with a valuable tool for efficient analysis and characterization of composite materials, contributing to advancements in the field of composite research.

**Keywords:** Composites, Software, Mechanical Properties, Elastic Modulus, Tensile Strength