Empowering Innovation, Technology and Artificial Intelligence For a Sustainable Future

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Abstract

This science project aims to investigate the mechanical behavior and endurance limits of material bundles subjected to external forces, with a specific focus on analyzing the influence of twisting on the generation of Maximum Shear Stress in a bundle of spaghetti. Spaghetti was selected as the representative material for this experiment due to its distinctively brittle nature, which allows for the precise observation of structural failure phenomena once the stress reaches a critical point.

The study applies the principles of mechanics of materials in conjunction with Helix Geometry to explain the redirection of forces and the accumulation of shear stress within the bundle at varying twist angles. The findings indicate that twisting directly contributes to an increase in shear stress within individual spaghetti strands, serving as the primary factor that leads to sudden fracture. This theoretical data was compared with empirical experimental results to determine the critical stress at which the spaghetti bundle loses its structural integrity. Ultimately, these findings provide a crucial foundation for understanding the engineering limitations of cable- and rope-like materials.

keywords : Torsion, Maximum Shear Stress, Modulus of Rigidity, Mechanics of Materials, Spaghetti Bundle