

# DETERMINING THE EFFECTS OF STRAIN RATE ON UNIAXIAL TENSILE BEHAVIOR OF SINGLE CURLY FIBER

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## Mechanical Properties of single curly hair

The elastic modulus and the maximum strength of the single curly fiber is of the interest in cosmetic industry to study the integrity of the hair fiber. The challenge arises with the mechanical and geometric profile variations of these fibers collected from one donor. In this study, the tensile tests were conducted under different strain-rate at room temperature to study determine the variation in the elastic modulus and maximum stress of the single curly hair.

## Background

Curly hair fibers are acknowledged to be fragile to mechanical stress compared to straight and wavy fibers[1]. This type of hair possesses the cross-sectional area with twists and bends with narrowed cross-sectional area along the fiber [2]. This can create the weak spots because when excessive force is applied [3] it can create high stress point over the small area of the fiber. These type of hair fibers are found amongst African population, and they received few attentions[4]. The studies across the cosmetic literature for hair fibers on the strength and elasticity are associated with the mechanical and chemical treatment[5]. The cosmetic industry may in turn look deeper in understating the behavior of curly hair to enable the market to perform specialized treatments for curly type hair only. This study focuses on the effect of strain-rate under dry condition at room temperature. Mechanical behavior of hair is critical in expanding knowledge that contributes cosmetic industry.

## Recent Advances

Understanding the behaviour of curly hair to enable the market to perform specialized treatments for curly type hair only. The mathematical modelling of experimental data has been generated from the experimental results.

## Future directions

The experimental results of this work will be used to estimate the material parameter of curly hair fiber which can then be used in 3D numerical modeling.

## References

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