A Parametric Investigation on the Neo-Hookean Material Constant

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Abstract. This paper assesses the Neo-Hookean material parameters pertaining to deformation behaviour of hyperelastic material by means of numerical analysis. A mathematical model relating stress and stretch is derived based on Neo-Hookean's strain energy function to evaluate the contribution of the material constant, C_1, in the constitutive equation by varying its value. A systematic parametric study was constructed and for that purpose, a Matlab programme was developed for execution. The results show that the parameter (C_1) is significant in describing material properties behaviour. The results and findings of the current study further enhances the understanding of Neo-Hookean model and hyperelastic materials behaviour. The ultimate future aim of this study is to come up with an alternative constitutive equation that may describe skin behaviour accurately. This vel as no similar parametric study on Neo-Hookean model has been reported before.

Keywords: Stretch, Neo-Hookean Model, Hyperelasticity, Incompressible materials

DOI: https://doi.org/10.4028/www.scientific.net/AMR.915-916.853