

## Assessment of Material Type, Diameter, Orientation and Closeness of Fibers in Vulcanized Reinforced Rubbers

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**Abstract :** In this work, the effect of material type, diameter, orientation and closeness of fibers on the general performance of reinforced vulcanized rubbers are investigated using finite element method with experimental verification. Various fiber materials such as hemp, nylon, polyester are used for different fiber diameters, orientations and closeness. 3D finite element models are developed by considering bonded contact elements between fiber and rubber sheet interfaces. The fibers are assumed as linear elastic, while vulcanized rubber is considered as hyper-elastic. After an experimental verification of finite element results, the developed models are analyzed under prescribed displacement that causes tension. The normal stresses in fibers and shear stresses between fibers and rubber sheet are investigated in all models. Large deformation of reinforced rubber sheet also represented with various fiber conditions under incremental loading. A general assessment is achieved about best fiber properties of reinforced rubber sheets for tension-load conditions.

**Keywords :** reinforced vulcanized rubbers, fiber properties, out of plane loading, finite element method

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