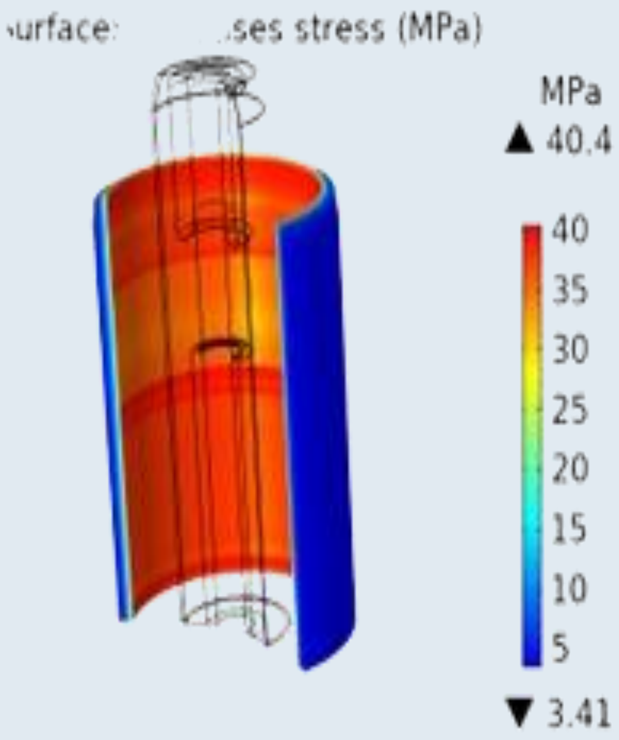

Non-linear Analysis of Polymer based cable connector for high voltage line

The development of methodology for determining stresses induced in polymer-based cable connectors using optimization module/curve fitting.

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Abstract

This research develops a methodology for determining the stresses induced in polymer-based cable connectors. These connectors need to be expanded radially, and their behavior can be modeled using various material models. Uniaxial stress-strain data from experimental tests on test specimens are used to compare the different material models. The least square error between the experimental values and the Yeoh 3-parameter model values is used to determine the material constants. These material constants are then used to predict the von Mises stresses in the polymer connector under the application of remaining boundary conditions. The results show that the proposed methodology is satisfactory and can be used for other material models in addition to the Yeoh 3-parameter model.

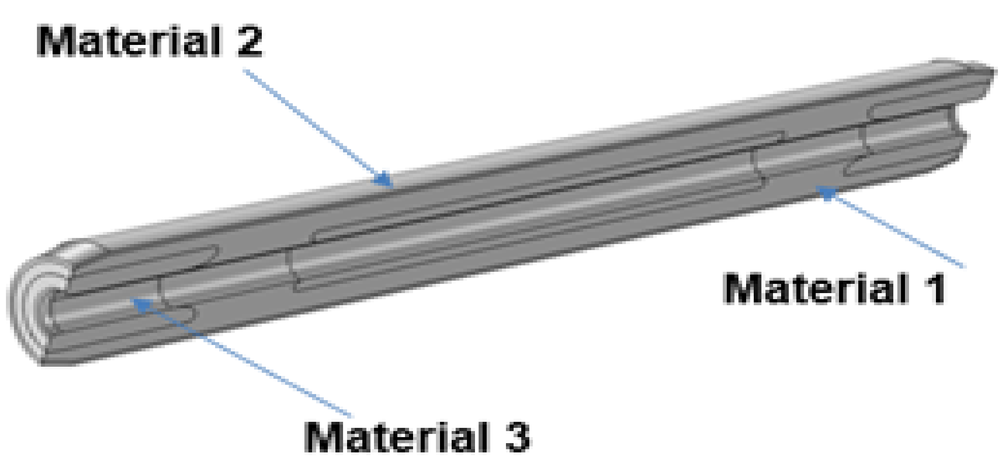

FIGURE 1. basic geometry and construction of Cable Joint/ Cable connector

Methodology

Evaluate which hyper elastic model best suitable for our data as discusses above. This is approach in which we are using curve fitting. A stress strain data from experimental method is used to determine the curve fitting for various models like Yeoh,, Arruada-Boyce, Mooney Rivlin, Neo-Hookean, Ogden etc. coefficients of a particular material model are determined. These coefficient/ constants are used as material input for non-linear model along with other boundary conditions in soldi mechanics. Von mises stresses are determined.

Results

Experimental uniaxial test data along with the material model equations are put in an optimization model.

Least Square experimental value and Yeoh 3 parameter model values are compared for materials.

Material model constants like C1 are determined. These constants have been used for defining properties of non-linear material.

Other boundary conditions have been applied and Simulation has been carried out based on transient or steady state behavior.

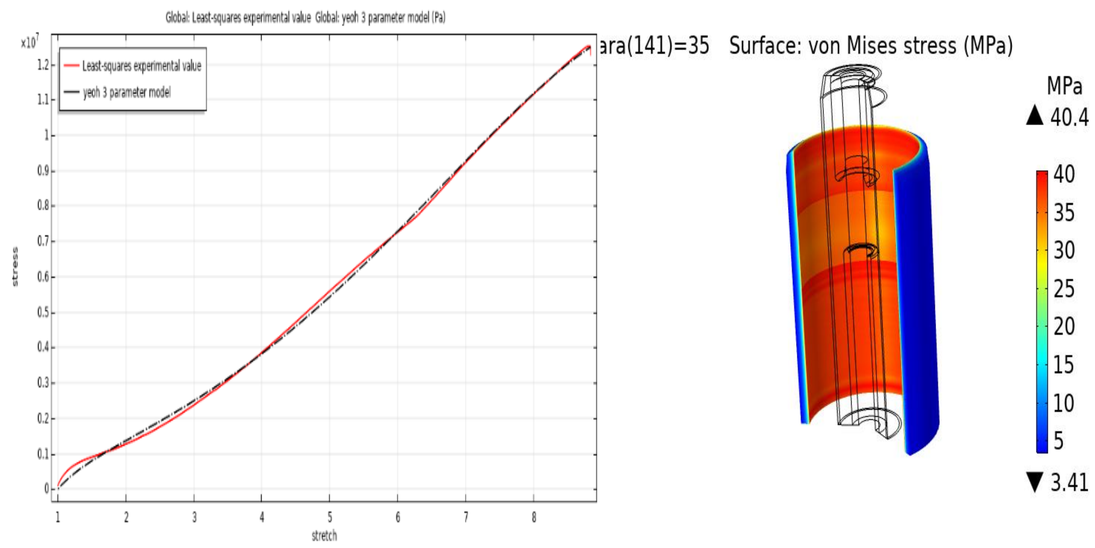

FIGURE 2. Left: comparison of Least Square experimental value and Yeoh 3 parameter model values for insulating layer material. Right: Von mises stresses induced due to radial expansion

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