

# Modelling of the behaviour of filled silicone architected membrane

M. Rebouah, G. Chagnon, D. Favier

*Université de Grenoble/CNRS, Laboratoire 3SR, Cedex 9, 38041 Grenoble, France.*

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## Abstract

Architected membranes can be developed in order to mimic living tissues. The main point is to generate anisotropic membranes that can endure large deformations. In this way, crenellated membranes are elaborated with a filled silicone rubber. The aim of this work is to develop a constitutive equation which describes the mechanical behaviour of such membranes. Membranes with different crenel orientations are elaborated and tested. The used filled silicone rubber presents a non linear behaviour with an important Mullins effect. These two phenomena must be taking account in the modelling. The equivalent model is built as the sum of the strain energy of each part of the architected membrane, a formulation in strain invariant is developed and adapted to numerical implementation. Finally finite element simulations are successfully compared to experimental results to validate the equivalent constitutive equation.

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