UNIVERSITI TEKNOLOGI MARA

THE DOCTORAL RESEARCH ABSTRACTS

Volume: 10, Issue 10 October 2016

TENTH ISSUE

INSTITUTE of GRADUATE STUDIES

IGS Biannual Publication

32

Name : NOR FAZLI BIN ADULL MANAN

Title : ASSESSING MULTIPLE APPROACHES AND VARIOUS HYPERELASTIC MODELS FOR BIOMECHANICAL PROPERTIES OF ANIMAL SKIN

Supervisor : ASSOC. PROF. DR. JAMALUDDIN MAHMUD (MS)
DR. MUHAMMAD HUSSAIN ISMAIL (CS)
DR. CATHY A HOLT (CS)

The importance of understanding skin behaviour, either in biological domain or engineering field has led to many researches. Researches about the anisotropic and viscoelastic behaviour were carried out on human, animal or synthetic skin. The simple structure can look from outside, but complex anatomy when study in details under the skin layer. The complicated behaviour of skin such as highly non-linear, viscoelastic, inhomogeneous and anisotropic clearly shows the complexity behaviour of skin, especially when measuring and quantifying its bio-mechanical properties. Therefore, this research aims to quantify the Bio-Mechanical properties of animal's skin via multiple approaches and adapting various hyperelastic constitutive models. Systematic methodology employed in this research starts with the experimental approach (in-vitro mechanical testing) followed by the analytical approach (theoretical derivation) then numerical approach (computational parameter quantification) and finally Finite Element simulation (skin model simulation). Each approach was analysed three different animal's skin (bovine, ovine and leporine) as the main subject individually. All approaches and animal skins were adapted with three hyperelastic constitutive models (Mooney-Rivlin, Neo-Hookean and Ogden model) for comparison purposes. It is found that the Ogden model and numerical approach are the best studied model and approach in choosing the suitable analysis procedure of animal skin or skin like materials. The results and finding prove that the current study is significant and has contributed to knowledge enhancement about the deformation behaviour of the animal's skin.