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Abstract
Biomaterials have been in clinical use for many years. Recent advances in Bio-related technology for medical application necessitate closer investigation of mechanical properties of biomaterials such as hydrogels. Hydrogels derive their name from their super absorbent natural. Hydrogels have inherently weak mechanical strength. However, the advantages of bio-compatibility and hydrophilicity make hydrogels become biomaterials for many medical applications. New developed high strength hydrogels have the potential to be used to repair the damaged articular cartilage or to be used as artificial nucleus pulposus replacement in the cervical disk due to the properties of low friction and high mechanical strength. In this study, the mechanical properties of aforementioned hydrogels were characterized. Non-contact optical method (digital image correlation, DIC) was developed and used to measure 2-D full-field deformation of specimen during the tests to assist the development of constitutive law from single axial and bi-axial tensile tests. Furthermore, by using DIC, 2-D full field strains measured during single notched tensile tests were used to develop a mixed numerical/experimental J-integral estimation method to quantify fracture parameters of hydrogels.
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