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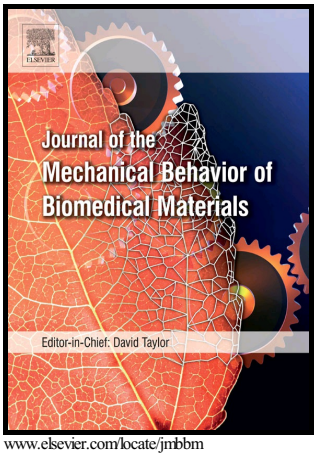

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Mechanical characterisation of oocytes - the influence of sample geometry on parameter identification

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Abstract

The present study focused on the material characterisation of porcine oocytes by experiments combined with an inverse finite-element method (iFEM) approach. In doing so, two different deformation states, compression and indentation, were realised to enable the validation of the numerical model. In addition to classical force-strain relations, geometrical information on the oocyte's surface and volume changes during deformation were collected. These data reveal the typical exponential force-strain behaviour and the highly compressible behaviour of the *zona pellucida*, imparting overall compressibility to the entire cell. Both force-strain characteristics and geometrical information, along with different combinations of them, were used within the iFEM to identify associated material parameters. As suspected, the identified material parameters show a strong dependence on the information (force-strain relation and/or geometrical information) used in the identification process. Finally, forward finite-element calculations were applied, which verified the quality of the obtained material parameters.

Keywords: oocyte · optical measurement · parameter identification · compression/indentation tests · inverse finite element method (iFEM) · compressible material