

Finite Element Modelling of the Human Intervertebral Disc

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Abstract

In this project, Finite Element Analysis (FEA) models were developed with varying complexities to mimic the mechanical behavior of the human intervertebral disc. The lumbar region of the human spine was taken into focus in this study. The developed models consisted of hyper-elastic material properties. In this study, the focus was placed on the vertical compression and associated displacement of the spinal disc under controlled compression loads.

The vertical displacement which was observed during the compressive loading conditions was then compared to that which was observed in past compression loading tests through a literature review. Currently work is being conducted at Oregon State University by the Rochefort Research Group in partnership with Dr. Brian Bay to develop spinal disc replacement material. This study was conducted in the hopes of establishing a reliable FEA model which would be used for further validating results obtained from compression testing revolutionary disc replacement materials. As the human anatomy is a highly complex system, modifications to the FEA model would allow fine tuning to achieve higher accuracy in observed data.

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