

Project proposal

Project title	Finite Element (FE) Modelling of the human eye with experimental validation	
First Supervisor	Professor <input type="checkbox"/>	Jian Wang
Second Supervisor	tbc	
School	Aerospace and Aircraft Engineering <input type="checkbox"/>	
Other member of supervisory team (no more than three KU supervisors in total)	Dr Indika Wanninayake Prof Barbara Pierscionek	
Specific requirements beyond 2:1 degree		

Project summary (max 4,000 characters)

MSc by research

The eyes are the major sensory organs of vision. The cornea and sclera are remarkably resilient to the ageing process but not to disease processes and, are potentially weakened after surgery because of alterations in the material properties. However, we still do not understand how the material properties of the cornea and sclera change with age, disease and surgical procedures. With the great difficulties of directly measuring on them, numerical modelling is used.

The aim of this project is to study the material properties of the cornea and sclera through finite element modelling. Objectives are as the following:

Critical literature review on the existing FE models for eyes

Experimental testing of ocular rheological properties

Development of novel human FE models with improved boundary conditions/the lens effects

Improved understanding of the material properties of the cornea and sclera

†Asejczyk-Widlicka, M., Śródka, W.D., Schachar, R.A. and Pierscionek, B.K. Material properties of the cornea and

sclera: a modelling approach to test experimental analysis Journal of Biomechanics 44: 543-546 (2011)

†Srodka, W. and Pierscionek, B.K. The effect of material properties of the eyeball coat on optical image stability.

Journal of Biomedical Optics 13, 054013 (2008)