PhD Scholarship in Applied Mathematics, NUI Galway, Ireland:
Machine Learning for Nonlinear Viscoelastic Tissue Characterization

Under the mentorship of Dr Bharat B. Tripathi and Professor Michel Destrade *

Outline

Nonlinear shear (shock) waves are formed inside the brain due the strong nonlinear nature of the brain tissue, possibly in the event of traumatic brain injury (Figure 1). The brain is also strongly dispersive and dissipative. A robust and accurate modeling of dispersion and attenuation in brain is essential to correctly model any type of wave propagation in brain or in any tissue.

This project will involve development of novel machine learning algorithms coupled with governing partial differential equations, pushing the state of art in both mechanics and machine learning, for discovering constitutive models describing the nonlinear-elastic and nonlinear-viscous behavior of soft solids.

Keywords Machine Learning, Computational science, Nonlinear continuum mechanics, Uncertainty quantification

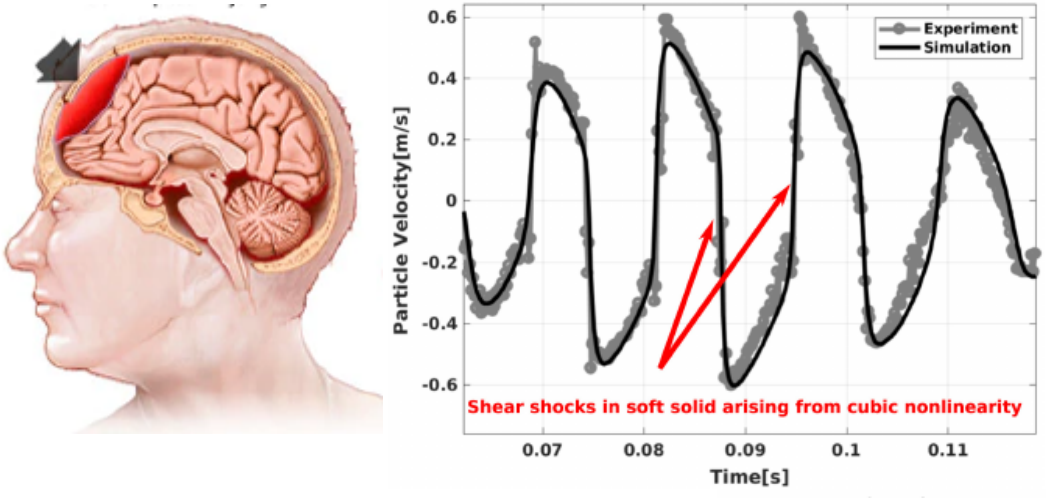

Figure 1: Left: Direct impact injury. Right: Snapshot of a linearly-polarized shear shock wave in brain.

Additional Details

- The annual value of the Scholarship is €14,400 for Year 1, and €16,000 for Years 2-4. In addition, course fees will be paid by the College if not paid from another source. Students may also earn up to €6,000 per annum from other sources (Local Authority Higher Education Grants, IRC Government of Ireland Scholarships, etc.).
- Start date: September 2021 and after.
- Interested candidates can reach out in case they have their own research ideas inline with the overall theme.

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