LMS Seminar

Morphing Structures: From Art to Science

Isaac Chenchiah

School of Mathematics, University of Bristol

Date, time, and venue

March 26, 2026 (2 – 3 pm), Amphithéâtre Pole Mecanique

Abstract

A morphing structure can change its shape in response to environmental conditions. For instance, a morphing aerofoil can adjust its shape according to atmospheric conditions and different phases of flight, such as take-off, cruising, and landing. Similarly, a medical implant might adapt as a patient grows or ages, reducing the need for additional surgical interventions. Despite its immense technological potential, this area of contemporary engineering research has received surprisingly little mathematical attention.

This talk explores a broad class of morphing structures: planar triangular frameworks comprising multi-stable edges. We examine their equilibrium states and characterise all hexagonal shapes, including those with an annulus. These findings represent the initial results of a research program aimed at developing mathematical tools that will transform the design of morphing structures from an art to a science.

About the speaker

Isaac Chenchiah is an Associate Professor at the School of Mathematics, University of Bristol, UK. After undergraduate education at IIT Madras, he received a PhD in Applied Mechanics from Caltech. Subsequently, he was a post-doc at the Max Planck Institute for Mathematics in the Sciences, Leipzig. Isaac Chenchiah works on solid and structural mechanics, mathematical biology, and related areas, often in close collaboration with biologists, biochemists, soft matter physicists, and aerospace/mechanical engineers. His areas of interest include multi-phase solids, architectured materials, adaptive and morphing structures, tissue mechanics and wound healing, and sensory biology. His recent work has laid the groundwork for an electromechanical explanation of aerial electroreception, a sensory modality that enables arthropods to detect and respond to electric fields.

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