Seminar/Talk

Elastic rod origami (RodOri) for programming static and dynamic mechanical properties

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Reconfigurable mechanical systems enable precise programmable control over structural properties, expanding opportunities in architected materials, adaptive devices, and multifunctional structures. Here, we introduce elastic rod origami (RodOri), a platform that exploits remarkably simple elementsprestressed, naturally curved rodsinto a system with an extraordinary degree of multistability and configurational richness. For example, a single six-rod RodOri unit can easily access 11 distinct configurations, far exceeding the reconfigurability of conventional origami or general mechanical reconfigurable systems. Individual rods, constrained under clamped boundary conditions, undergo transitions between discrete morphologies whose strain energy and stiffness are precisely prescribed by their natural curvature. Assembling these rods into modular multirod architectures yields metamaterials with numerous stable configurations that can be selectively and reversibly programmed. This configurational diversity enables tunable static stiffness and nonlinear force response, thus enabling tunable dynamic behaviors such as vibration filtering, wave propagation switching, and mode conversion within a single, easily manufactured platform. By leveraging curvature-induced mechanical instability, RodOri unlocks highly programmable static and dynamic mechanical behavior, offering tailorable design strategies for reconfigurable structures, soft robotics, medical devices, and adaptive materials.

Wednesday, June 3, 2026 11:00am - 12:00pm
Mondi Seminar Room 2, Central Building

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