



MECHANICAL ENGINEERING GRADUATE STUDENT SEMINAR SERIES

Sunday, May 03, 2026, at 12:30, Lady Davis Building, Auditorium 250

Multistable Structures - Fabrication and Applications

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Multistable structures provide a simple and elegant way to achieve programmable shape morphing, controlled deployment, and energy storage without continuous input. In recent years, my doctoral work has focused on developing instability-based fabrication method that allow rapid, scalable, and cost-effective fabrication of multistable structures in a wide range of length scales. This method utilizes pre-defined patterns to achieve controlled mechanical instabilities which form buckling patterns that enable twisting, bending, elongating, or combined multistable structures. This approach overcomes the limitations of traditional fabrication techniques, such as casting or 3D printing, and opens new opportunities for designing functional systems based on multistability.

In this seminar I will present the core fabrication principles and demonstrate how these structures can be integrated into systems that take advantage of their unique mechanical properties. I will show applications including growing soft robots capable of maneuvering in complex and confined environments, mechanically driven metafluids that enable energy harvesting and cooling cycles, and shape morphing structures that rapidly deploy from compact configurations. These systems illustrate how combining geometry, flow, and mechanical instabilities can create simple, robust, and scalable mechanisms for soft robotics, adaptive materials, and deployable structures.

The seminar will highlight how these ideas form a unified framework for designing reconfigurable systems and how instability-based fabrication expands the design space of soft actuators. The research presented in this talk is based on a series of studies published in *Advanced Materials*, *Nature Communications*, *Materials Today Physics*, *Advanced Materials Technologies*, *Advanced Engineering Materials*, and *Physical Review Applied*, and includes collaborative work with Columbia, Michigan, Westlake, and Ljubljana universities.

Note: the seminar will be given in English