



SEMINAR

APPLIED MATHEMATICS AND MECHANICS

FS993

21.March 2024

A DCAMM seminar No. 771 will be presented by

Associate Professor Vinayak Krishnamurthy
Texas A&M University, USA

The title of the lecture is

**From Skin Cells to Jigsaw Puzzles: Partitive Geometry &
its applications to Design & Manufacturing**

Abstract:

Natural systems, organic or inorganic, embody spatial growth as one of the working principles that is central to the development of complex forms with a wide range of mechanical functions. In this talk, we take inspiration from this tenet and investigate partitive geometry – a new paradigm for geometric modelling for design and manufacturing. Partitive geometry leverages the geometric principles of growth in physical, chemical, and biological systems and offers a new representation for complex 2D and 3D lattices. Starting with an example from the biological world, we will see how spatial growth manifests in animal skin cells and discuss computational schemes to capture this growth for designing a range of geometric structures. We will then develop the idea of partitive geometry in the context of designing topologically interlocking shapes and auxetic structures using spatial symmetries induced by textile weaves. The talk will expose these ideas through specific examples of structural (or architected) materials and path planning algorithms for cooperative manufacturing. Finally, we will look at partitive geometry from the broader perspective of fundamental geometric representations for generative design and manufacturing.

DATE:	Wednesday, 10 April 2024
TIME:	15:00 – 15:45
PLACE:	Aarhus University, Dept. of Mechanical and Production Engineering Katrinebjergvej 89 G-F, 8200 Aarhus N Room 5132-229

Danish pastry, coffee and tea will be served 15 minutes before the seminar starts.

All interested persons are invited.

Niels Leergaard Pedersen

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