Department of Applied Mathematics Seminar

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Topic
Rotor Decomposition in Three-Dimensional Projective Geometry and Affine Geometry

Date| Time
18 July 2025 (Friday) | 10:00am – 11:00nn (HK Time)

Venue
TU817

Abstract:
Rotor construction of rigid-body motion in three-dimensional Euclidean geometry has been a representative use-case of Geometric Algebra in Robotics and Geometric Reasoning. Extending Rotor construction to three-dimensional projective geometry and affine geometry can be done via the $R^{(3,3)}$ model of line geometry, where lines are basic geometric entities, and points and planes are constructed from lines.

In this talk, we focus on decomposing orientation-preserving projective transformations and affine transformations into compositions of Minkowski bispinors with the shortest number, each being the geometric product of two invertible vectors in $R^{(3,3)}$, such that the 2-space spanned by the two vectors has Minkowski signature, and thus each bispinor induces a projective transformation in the projective case, or an affine transformation in the affine case. In this way, every orientation-preserving projective or affine transformation is given the most compact decomposition into projective or affine transformations each having the simplest synthetic geometric construction.

ALL ARE WELCOME