明治大学先端数理科学インスティテュート

MIMS現象数理カフェセミナー

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Mathematical Modeling and Analysis of Fruit Skin Patterns

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Abstract：In nature, there are many tessellation patterns on curved surfaces that look like Voronoi diagrams. Typical examples are the patterns found on fruit skins. Verifying that a given tessellation is a Voronoi diagram will be useful for constructing mathematical models of polygonal patterns. However, the data are usually obtained as a 2D projected image, and hence it is not easy to compare it with a Voronoi diagram on a curved surface. We propose frameworks for using a photograph of a fruit to measure the difference between the pattern on its skin and a spherical Voronoi diagram. The problem of finding the spherical Voronoi diagram that best fits the fruit skin pattern is reduced to an optimization problem. In addition, we also find the spherical Laguerre Voronoi diagrams which best fit to the planar tessellations. The validity of this formulation is evaluated using jackfruit and lychee.

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