Session (M) Mathematical Aspects of Crystal Growth and Image Analysis
(organized by R. Caflisch and Y. Giga)

Professor Chiu-Yen Kao was forced to cancel his visit because of health reason. His talk is replaced by the following talk which is scheduled to be held in Room 204 for the period of 15:30-15:55, July 2 (Tuesday).

On fully faceted phenomena for small growing crystals in the plane

Mi-Ho Giga and Yoshikazu Giga
(Graduate School of Mathematical Sciences, The University of Tokyo, Japan)

Abstract: We consider crystalline curvature flow equations with a spatially homogeneous driving force for a planar curve. If initial shape is bigger than the equilibrium shape, the solution curve grows and eventually sweeps whole the plane. A level set method for a crystalline flow has developed by the authors around a decade ago. It enables us to start with arbitrary initial data not necessarily a polygon but a general curve.

Based on this theory we shall prove that if the initial shape is larger but sufficiently close to the equilibrium shape, then its shape becomes fully faceted under some assumptions of interfacial energy and mobility at least for a convex initial data.

Our results lead to a mathematical interpretation that a snow crystal becomes a hexagonal prism when it is very small and gradient of super -saturation is small around the crystal.