Traveling waves in a sawtoothed cylinder and their homogenization limit

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My talk is concerned with a curvature-dependent motion of plane curves in a two-dimensional cylinder with spatially undulating boundary. In other words, the boundary has many bumps and we assume that the bumps are aligned in a spatially recurrent manner.

The goal is to study how the average speed of the traveling wave depends on the geometry of the domain boundary. More specifically, we consider the homogenization problem as the boundary undulation becomes finer and finer, and determine the homogenization limit of the average speed and the limit profile of the traveling waves. Quite surprisingly, this homogenized speed depends only on the maximal opening angles of the domain boundary and no other geometrical features are relevant.

Next we consider the special case where the boundary undulation is quasi-periodic with m independent frequencies. We show that the rate of convergence to the homogenization limit depends on this number m.

This is joint work with Bendong Lou and Ken-Ichi Nakamura.

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