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## Wave–pinning Mathematical Model of Plant Root Hair Initiation

A simple mathematical model is developed of a key cellular–level process in plant morphogenesis, namely the biochemical process which triggers outgrowth of a hair within a root hair cell of *Arabidopsis*. It involves the dynamics of the small *G–proteins* known as *ROPs* which bind to a specific location on the cell membrane, triggering cell wall softening and subsequent hair growth. A non–homogeneous reaction–diffusion model is taking into account where a catalytic effect of the hormone auxin is described which is experimentally known to play an important role in the location of the hair on the cell. Local analysis, numerical bifurcation analysis and numerical simulation in 1D are used to the better understanding the dynamics of location point of the root hair formation.

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