Dynamic Transitions and Hexagonal Patterns in Surface Tension Driven Convection

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In this talk, we study dynamic transitions and the hexagonal pattern formation in the surface tension driven convection. It is shown that as the Marangoni number crosses the critical threshold, the system always undergoes a dynamic transition, with the types of transition dictated by some computable nondimensional parameters. In addition, the formation and classification of hexagonal patterns are precisely determined by metastable states and their basin of attractions.