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Flow-driven instabilities during aggregation and pattern formation of Dictyostelium Discoideum: Experiments and modeling AZAM GHOLAMI, Max-Planck Institute of Dynamics and Self-Organization, Goettingen, Germany., OLIVER STEINBOCK, Department of Chemistry and Biochemistry, Florida State University, Tallahassee, FL, USA., VLADIMIR ZYKOV, EBERHARD BODENSCHATZ, Max-Planck Institute of Dynamics and Self-Organization, Goettingen, Germany. — We report the first experimental verification of the Differential Flow Induced Chemical Instability (DIFICI) in a signaling chemotactic biological population, where a differential flow induces traveling waves in the signaling pattern. The traveling wave speed was observed to be proportional to the flow velocity while the wave period was 7 min, which is comparable to that of starved Dictyostelium cells. Analysis and numerical simulations of the Goldbeter model show that the resulting DIFICI wave patterns appear in the oscillatory regime. In the experiments, we observe that the DIFICI wave pattern disappears after 4-5 h of starvation. We extrapolated the Goldbeter model to the experimental situation. This suggests that the dynamics switches from the oscillatory to the excitable regime as the DIFICI waves disappear in the experiment.

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