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Starbursts and Wispy Drops : Surfactants Spreading on Gel Substrates[1] SHOMEEK MUKHOPADHYAY, Physics Department, Duke University, KAREN DANIELS, Department of Physics, North Carolina State University, ROBERT BEHRINGER , Physics Department, Duke University — We report a phase diagram for a novel instability seen in drops of nonionic surfactant solution (Triton X-305) spreading on viscoelastic agar gel substrate . This system allows us to examine the effect of varying the effective fluidity/stiffness of aqueous substrates. The morphology is strongly affected by the substrate fluidity, ranging from spreading starbursts of arms on weak gels, to wispy drops on intermediate strength gels, to circular drops on stiff gels. We analyze the dynamics of spreading in the starburst phase, where the arm length grows as t $^{3/4}$at early times, independent of the gel strength and surfactant concentration. The number of arms is proportional to the surfactant concentration and inversely proportional to the gel strength. Ongoing work is exploring the effects of changing the drop volume.

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