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Dynamics of morphology formation in phase-separation fronts
ALEXANDER WAGNER, ERIC FOARD, Department of Physics, North Dakota State University — We discuss the formation of domains in the wake of a phase-separation front in one, two and three dimensions. Perhaps surprisingly, if such a phase-separation front migrates with a constant velocity it will form very regular structures of lamellar domains or cylindrical columns oriented either parallel or orthogonal to the phase-separation front. We show analytical predictions of how the structure, orientation, and size of the formed domains depends on the speed of the phase-separation front (as well as the volume fraction) if the dynamics is purely diffusive and show numerical verification of our theoretical results. When hydrodynamics becomes important, however, the results are more complicated: in more than one dimension the formed structures become more fractal in nature, with structures on many different length-scales.

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