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Simulating Striped Phases on Curved Surfaces[1] ROBIN L. B. SELINGER, JONATHAN V. SELINGER, Kent State University — Ordered phases on curved surfaces often exhibit geometrical frustration: if the order is incompatible with the curved geometry, the phase must form a complex pattern of defects. Many recent theoretical and experimental studies have explored the relationship between curvature, order, and defects in crystalline, nematic, and striped (smectic or columnar) phases. In earlier work, we developed a new approach for simulating the orientational order of nematic phases on curved surfaces. We now present an analogous approch for simulating striped phases. This approach is based on a lattice gas, in which the Ising spin represents the local density variable. Long-range antiferromagnetic interactions between the spins induce the formation of a striped phase, with a wavelength proportional to the interaction range. This model can be simulated on a random mesh, which can be defined on any arbitrary curved geometry. Through these simulations, we determine how striped phases respond to curvature on spheres, tori, and other geometries.

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