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The Smectic Order of Wrinkles HILLEL AHARONI, DESISLAVA V. TODOROVA, Univ of Pennsylvania, OCTAVIO ALBARRÁN, Max Planck Institute (MPIDS), LUCAS GOEHRING, Max Planck Institute (MPIDS) and Nottingham Trent University, RANDALL D. KAMIEN, ELENI KATIFORI, Univ of Pennsylvania — A thin elastic sheet lying on a soft substrate develops wrinkled patterns when subject to an external forcing or as a result of geometric incompatibility. Thin sheet elasticity and substrate response equip such wrinkles with a global preferred wrinkle spacing length and with resistance to wrinkle curvature. We show how the behavior of these systems can be described compactly by the theory of liquid crystalline smectics at intermediate length scales. This insight allows better understanding of the wrinkling patterns seen in such systems, with which we explain pattern breaking into domains, the properties of domain walls and wrinkle undulation. We compare our predictions with numerical simulations and experimental observations.

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