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Abstract. Strained epitaxial films grown on a relatively thick substrate are considered in the context of plane linear elasticity. The total free energy of the system is assumed to be the sum of the energy of the free surface of the film and the strain energy. Because of the lattice mismatch between film and substrate, the configurations are in general energetically unfavourable and a corrugated or islanded morphology is the preferred growth mode of the strained film. After specifying the functional setup where the existence problem can be properly framed, a study of the qualitative properties of the solutions is undertaken. New regularity results for volume constrained local minimizers of the total free energy are established, leading as a by product, to a rigorous proof of the zero contact-angle condition between islands and wetting layers.