Transitions in a compressible finite elastic sheet on a fluid substrate OZ OSHRI[1], HAIM DIAMANT[2], Tel Aviv University — A thin elastic sheet, supported on a fluid substrate and uniaxially compressed, exhibits two critical transitions: From a flat state to sinusoidal wrinkles and from wrinkles to a localized fold. Previous theoretical studies treated the system in the limits of incompressible and infinite sheets. Both assumptions are relaxed in the current work to obtain details of the transitions and the phase diagram. Deriving an amplitude equation and using a variational approach, we show that the flat-to-wrinkle transition is second-order, whereas the wrinkle-to-fold one is first-order. The pressure-displacement relation is linear above the first transition and becomes parabolic after the second one, in agreement with numerical results.

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