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Wetting on a deformable substrate with finite deformations and asymmetrical substrate surface energies. LAURENT LIMAT, RICCARDO DE PASCALIS, JULIEN DERVAUX, MSC lab., Matiere et Systemes Complexes, UMR7057 of CNRS and Univ Paris Diderot, IOAN IONESCU, LSPM, UPR3407 of CNRS, Institut Galile, Univ. Paris 13, BENOIT PERTHAME, J.-L. Lions lab., Univ. P. M. Curie, Univ. Paris Diderot and CNRS, UMR7598 — Wetting on soft compounds is still imperfectly understood, especially when the dry and wetted parts of the substrate have two different values of surface energies (contact angle different than 90 degrees). The problem is made very complex by geometrical non-linearities arising from finite slope of the substrate and finite deformations, that must be absolutely considered, to distinguish at second order between Young law and Neuman equilibrium of surface tensions. We have developed a numerical, finite element, code that allows one to minimize surface and bulk energies, with finite deformations and asymmetry of the surface energies. The results are compared to a linear theory based on Green function theory [1,2] and Fredholm integrals, and with recent experiments using X-ray visualization [3]. The non-linear numerics reproduce very well the observed profiles, while the linear approach gives helpful analytical approximates. [1] L. Limat, EPJ-E Soft Matter, 35, 134 (2012). [2] J. Dervaux & L. Limat, Proc. Roy. Soc. A 471, 20140813 (2015). [3] S. J. Park, B. M. Weon, J. S. Lee, J. Lee, J. Kim & J. H. Je, Nature Com. 5, 4369 (2014).

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