Two dimensional droplets under partially wetting conditions: New analytical solutions J.M. GOMBA, Facultad de Ciencias Exactas - Universidad Nacional del Centro - Argentina, G.M. HOMSY, Dept. Mech. Engr, UCSB, USA — We present new analytical solutions that describe the static shape of a two-dimensional droplet in equilibrium with a surrounding thin film on a solid substrate. We model a partially-wetting liquid by a disjoining-conjoining pressure description of intermolecular forces between the liquid and solid substrate. The profile involves three regions: (i) a droplet core, (ii) a thin film region and (iii) an intermediate contact line region. The description of the droplet shape in these regions is usually carried out by series expansions or numerical solutions. In contrast, here we derive new fully- analytical solutions for the shape of the droplet, the cross sectional area, the half width and the maximum curvature. We also study the effects of the size of the droplet on the apparent contact angle. We find that for nanodroplets the contact angle follows a power law dependence with the cross sectional area, reaching a well defined value for larger droplets.

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