1086-74-314 **Anna Zemlyanova*** (azem@math.tamu.edu), Department of Mathematics, Mailstop 3368, Texas A&M University, College Station, TX 77843. *A surface-tension-based approach to the elimination of crack-tip singularities in fracture mechanics.*

A new model of fracture mechanics incorporating a curvature-dependent surface tension acting on the boundaries of a crack is considered. The model is studied on the example of a single curvilinear crack in an infinite thin plate. Linear elasticity is assumed for the behavior of the material of the plate in a bulk. A non-linear boundary condition with a consideration for a surface tension dependent on the curvature of the crack is given on the crack boundary. Using the methods of complex analysis, such as Muskhelishvili complex potentials and Savruk's integral representations, the problem is reduced to a system of two singular integro-differential equations. This system is further reduced to a system of two Fredholm equations. It is proved that the introduction of the curvature-dependent surface tension eliminates classical power singularities of the order 1/2 at the tips of the crack. Numerical computations are presented. (Received August 20, 2012)