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**Lauren Ferguson** and **S. M. Mallikarjunaiah\***, Department of Mathematics, Mail Stop 3368, Texas A&M University, College Station, TX 77843, and **Jay R. Walton**. *On a Nonlocal Finite Element Formulation of Mode-III Brittle Fracture With Surface Tension Excess Property.*

In this work, we study a nonlocal finite element formulation of mode-III brittle fracture in a homogeneous, linear elastic body. The modified continuum-mechanics model incorporates a curvature dependent surface tension on the crack surface that gives rise to a linearized jump momentum balance (JMB) crack-face boundary condition containing higher order tangential derivatives. For a numerically stable finite element implementation, we propose a reformulation of the JMB using a boundary Green's function and Hilbert's transform resulting in a Fredholm second kind integral equation for the crack-edge Neumann data. The obtained numerical results indicate bounded crack-tip stresses and a cusp-shaped crack-surface opening profile with a sharp crack-tip. (Received July 29, 2015)