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A MEMS equation with fringing field

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We construct solutions of the equation

$$-\Delta u = \frac{\lambda(1+|\nabla u|^2)}{(1-u)^2}, \quad 0 < u < 1$$

in a bounded smooth domain of $\mathbb{R}^2$ with Dirichlet boundary condition, for $\lambda > 0$ small. These solutions approach 1 as $\lambda \to 0$ at one point, and if Ω is not simply connected we find solutions forming singularities at many points. The equation arises in the modeling of a MEMS with fringing field. A connection with plasma problem is found.

This is joint work with Juncheng Wei, Chinese University of Hong Kong.

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