1075-49-61 **Andrew Lorent*** (lorentaw@uc.edu), University of Cincinnati, Clifton Avenue, Cincinnati, OH 45219. *On the problem of characterizing the minimizers of the Aviles Giga functional.*

Given a connected Lipschitz domain Ω we let $\Lambda(\Omega)$ be the subset of functions in $W^{2,2}(\Omega)$ with $u = 0$ on $\partial\Omega$ and whose gradient (in the sense of trace) satisfies $\nabla u(x) \cdot \eta_x = 1$ where η_x is the inward pointing unit normal to $\partial\Omega$ at x. The functional $I_\epsilon(u) = \frac{1}{2}\int_\Omega \epsilon^{-1}\left|1 - |\nabla u|^2\right|^2 + \epsilon\left|\nabla^2 u\right|^2 dz$ minimised over $\Lambda(\Omega)$ serves as a model in connection with problems in liquid crystals and thin film blisters, it is also the most natural higher order generalization of the Modica Mortola functional. This functional is known as the Aviles Giga functional, we discuss the two main open problems concerning this functional focusing principally on the problem of characterizing the minimizers. We will survey the results of Jabin, Otto, Perthame, Aviles, Giga and a recent quantitative generalization. (Received August 19, 2011)