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Jochen Denzler* (denzler@math.utk.edu). *A study of the oval problem.* Preliminary report.

The oval problem asks to minimize the principal eigenvalue λ of the Schrödinger operator on a closed loop of length 2π , whose potential is the curvature squared. Among the conjectured minimizers, one finds the circle as expected, but it lies within a 1-parameter family of ovals known to have the same principal eigenvalue $\lambda = 1$. The author proved existence of a minimizer, as well as regularity, planarity and convexity, but a full solution of the problem has been missing for over 10 years. The Euler-Lagrange equation for a minimizer, while elusive to solve, displays some promising structure that sheds some new light on the problem. This is work in progress. (Received February 02, 2015)