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A fourth order equation modelling a simple MEMS device

We examine the equation

$$\Delta^2 u = \frac{\lambda}{(1-u)^2} \quad \text{in B,}$$

with zero Dirichlet boundary conditions where B is the unit ball in $\mathbb{R}^N$ and where $\lambda > 0$ is a parameter. We show that the *extremal solution*, u^*, is smooth provided $N \leq 8$ and singular for $N \geq 9$.

This equation is of practical interest since it is the steady state of an equation modeling a simple Micro-Electro-Mechanical System (MEMS) device.