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Stability and Regularity in elliptic systems and 4th order equations

We examine nonlinear fourth order eigenvalue problems on bounded domains of N -dimensional space. We show –among other things– that for exponential nonlinearities, the extremal solution is smooth provided the dimension N is below 10.718. To do that, we isolate a new stability inequality satisfied by minimal solutions that is more amenable to estimates, as it allows a method of proof reminiscent of the second order case. This new approach leads to substantial improvements of various results on critical dimensions obtained recently by various authors. This is joint work with Craig Cowan.