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FINITE MORSE INDEX SOLUTIONS AND THE BRANCH OF POSITIVE SOLUTIONS OF EXPONENTIAL PROBLEMS

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We discuss the recent proof that the branch of positive solutions of $-\Delta u = re^u$ in D , $u = 0$ on the boundary of D starting from $(0,0)$ has infinitely many bifurcation points. Here D is a bounded smooth 3-dimensional domain. This generalises to general domains results only known for the ball and the annulus. We also discuss the generalisation to N dimensional domains for N between 3 and 9 (joint work with Dupaigne and Farina) and the two key ingredients in the proof: real analytic bifurcation theory and finite Morse index solutions of our equation on the whole space. We also briefly discuss corresponding results for nonlinearities asymptotically a supercritical power.

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