Semilinear elliptic equations, the Fredholm alternative, and Wentzell boundary conditions

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Abstract. Of concern are extensions of a classical result of Landesman and Lazer which gives necessary and sufficient conditions for existence of solutions of certain semilinear elliptic equations with homogeneous Neumann boundary conditions. Our extensions involve much more general boundary conditions, which can have higher order terms, which can be nonlinear, and which can be inhomogeneous. The proofs involve convex analysis (subdifferentials) and the work of Favini-Goldstein-Goldstein-Romanelli on Wentzell boundary conditions. This research was jointly done with Ciprian Gal, Gisele Ruiz Goldstein and Silvia Romanelli.