An old and a new topological tool for nonlinear analysis

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L01 Carson Hall, 4:00 pm
(Tea 3:30 pm Math Lounge)

Abstract

In the first part of the talk, we will see how one of the earliest fruits of algebraic topology, the Brouwer Fixed Point Theorem, leads to the Schauder Fixed Point Theorem, an old (1930) but still widely used tool for proving the existence of solutions to problems involving nonlinear differential equations. Application to a forced pendulum problem and an equilibrium heat distribution problem will demonstrate the use of Schauder's theorem. The second part of the talk will discuss how, starting in the late 1980's, the Nielsen number of topological fixed point theory has been used to establish the existence of multiple solutions to nonlinear analytic problems. Multiple controllability results in control theory will illustrate the use of this new topological tool.

This talk should be accessible to graduate students.