DEGREE THEORY FOR PROPER C^1 FREDHOLM MAPPINGS WITH APPLICATIONS TO BOUNDARY VALUE PROBLEMS ON THE HALF LINE

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We overview elements of the definition and several properties, of a degree theory for proper C^1 Fredholm mappings of index zero [1, 2]. We establish sufficient conditions for solvability of an ODE system $\dot{v} + g(t, w) = f_1(t)$, $\dot{w} + h(t, v) = f_2(t)$ under various boundary conditions on the half line. Note that the unbounded domain prevents the use of Leray-Schauder degree. We establish sufficient conditions for solvability of a semilinear parabolic PDE $u_t - A(t)u + F(t, x, u) = f(t, x)$, once again with conditions at $t = 0$ and as $t \to \infty$. These applications illustrate methods to meet the conditions associated with the degree theory, including smoothness, properness, the Fredholm property, and the establishment of *a priori* bounds. (Note: this is an exposition of work previously published [3, 4].)

REFERENCES

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