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WEAK PERIODIC SOLUTIONS FOR A CLASS OF REACTION-DIFFUSION PROBLEMS

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Abstract: The focus of our research paper is on exploring a quasilinear parabolic reaction-diffusion problem that includes a nonlinearity in gradient and nonlinear boundary conditions. This problem is relevant to the study of diffusion in different scientific fields. Our approach involves utilizing functional analysis techniques, specifically Schauder's fixed point theorem, to establish the existence of weak periodic solutions.

Keywords and Phrases: Reaction-diffusion equation, fixed point theorem, weak periodic solutions.

2020 Mathematics Subject Classification: 35K57, 35B10, 47H10.

1. Introduction

Reaction-diffusion equations can be used to quantitatively represent many periodic phenomena in the physical, environmental, and biological domains. An example of such systems is the one introduced by Badii [3], which models the movement of water and salt in a porous medium subject to water extraction by mangrove roots. One prominent example is also the Belousov-Zhabotinsky reaction, which involves the periodic oscillation of chemical concentrations. This reaction has been used to model phenomena such as heartbeats and circadian rhythms. Other related models can be found in [10]. For a selection of significant recent findings on