

ABSTRACT

ASYMPTOTIC BEHAVIOUR OF SOLUTIONS OF SEMILINEAR HEAT
EQUATIONS WITH SOURCE

Duran, Ahmet

M.S., Department of Mathematics

Supervisor: Prof.Dr. A. Okay ÇELEBİ

September 1998, 101 pages.

In this work, we will recover the known results on asymptotic behavior of solutions of problems for some semilinear heat equations of the form

$$u_t - \Delta u = f(x, u, u_x)$$

with the Dirichlet boundary condition, in a bounded domain $\Omega \subset \mathbb{R}^N$.

Key words: semilinear heat equations, decay rate of solution, blow-up, boundedness of global solutions, large time behavior.

TABLE OF CONTENTS

ABSTRACT	iii
ÖZ	iv
ACKNOWLEDGEMENTS	v
TABLE OF CONTENTS	vi
CHAPTER	
1. INTRODUCTION	1
1.1 The Sobolev Spaces $W^{m,p}(\Omega)$ and Related Definitions	12
2. OBSERVATION ON DECAY BEHAVIOR OF	
SOLUTIONS OF A CLASS OF SEMILINEAR PARABOLIC	
EQUATIONS	17
2.1 Introduction	17
2.2 Decay Properties of The Semilinear Heat Equation	
$u_t = u_{xx} + f(u)$	18
2.3 Global Decay Estimates For Parabolic Equations With	
Nonlinear Transport Terms	28
3. BLOW-UP FOR THE SEMILINEAR HEAT EQUATIONS	
WITH SOURCE	61
3.1 Introduction	61
3.2 Blow-up of Solutions With Sign Changes For The Semilinear Heat	
Equation $u_t - u_{xx} = \lambda h(u)$	62
3.3 Blow-up For The Solutions of The Semilinear Heat Equation	
$u_t - du_{xx} = u^q - (1 - \cos\pi x)u^p$	68

4. BOUNDEDNESS OF NOT BLOWING UP SOLUTIONS OF SEMILINEAR HEAT EQUATIONS	75
4.1 Introduction	61
4.2 Behavior of The Solution of $\frac{du}{dt} + Au = h(u)$	76
4.3 An Application	84
 REFERENCES	 98