

TABLE OF CONTENTS

DEDICATION	ii
ACKNOWLEDGEMENTS	iii
LIST OF FIGURES	vi
CHAPTER	
I. Introduction	1
1.1 Introduction and definitions	1
1.2 Results achieved	3
1.2.1 On existence and uniqueness of wavefronts solution for local reaction-diffusion equations with delay	3
1.2.2 Existence of wavefronts solution for non-local reaction-diffusion equations with delay	6
1.2.3 Uniqueness of semi-wavefronts for non-local reaction-diffusion equations	8
1.2.4 Upper and lower bounds for the minimal speed of propagation	11
1.2.5 General theory	12
1.3 Organization of the thesis	12
II. Preliminaries	14
2.1 Introduction	14
2.2 Heteroclinic solutions of scalar delay differential equation	15
2.3 Uniform permanence of wavefront	17
2.4 Small solutions for equations	18
2.5 Asymptotic behavior of solutions for linear equations with delay	19
2.6 Oscillations of the linear scalar delay equations	19
III. General theory	22
3.1 Introduction	22
3.2 Mollison's condition and the exponential rate of convergence	27
3.3 Abscissas of convergence	30
3.4 A bootstrap argument	35
3.5 The uniqueness theorems	41
3.6 Applications	53
3.6.1 Nonlocal integro-differential equations	53
3.6.2 Nonlocal lattice equations	57
3.6.3 Nonlocal reaction-diffusion equation	60
3.6.4 Uniqueness of fast traveling fronts in delayed reaction-diffusion equations	64

IV. Existence and uniqueness of fast travelling fronts in reaction-diffusion equation with local delay	67
4.1 Introduction	67
4.2 Spaces and Operators	68
4.3 Lyapunov-Schmidt reduction	74
4.4 Characteristic equation	76
4.5 Asymptotic formulae of solutions	76
4.6 Existence of fast traveling wave	81
4.7 Uniqueness Theorems	84
4.8 Nonmonotonicity of travelling wave	86
4.9 Application	86
V. Existence of fast positive wavefronts for a non-local delayed reaction-diffusion equation	90
5.1 Introduction	90
5.2 Spaces and operators	91
5.3 A charecteristic equation	97
5.4 Asymptotic expansions	101
5.5 Existence of a continuous family of positive wavefronts	108
5.6 Non-monotonicity of wavefronts	111
5.7 Application	114
VI. On the uniqueness of positive semi-wavefronts for non-local delayed reaction-diffusion equations	116
6.1 Introduction	116
6.2 Preliminaries	117
6.3 Characteristic equations	119
6.4 Asymptotic formulae for semi-wave profile	121
6.5 Uniqueness of positive semi-wavefront	128
VII. On the minimal speed of traveling waves for a non-local delayed reaction-diffusion equation	133
7.1 Estimation of the minimal speed of propagation	133
7.2 An example	137
BIBLIOGRAPHY	139

LIST OF FIGURES

Figure

1.1	An example of a profile ϕ of equation (1.3) with $c = 2$ and $\phi(0) = 106$	3
1.2	$g(s) = pse^{-s}$, $p = 5$	5
2.1	An example of birth function g	18
2.2	Oscillating wave solutions, see [52].	20
5.1	$G(z, \varepsilon)$ and $H(z, \varepsilon)$, $z \geq 0$, $ \varepsilon > 0$ small.	101
6.1	$G(z, c)$ and $H(z, c)$, $z \geq 0$, $c > c_0$	121
7.1	G , H and R for $h > 1$	137
7.2	The minimal speed and its bounds ($p = 2$ and $\alpha = 1$).	138