

# Contents

Contents	i
Preface	iii
<b>1 Introduction</b>	<b>1</b>
<b>2 Notations and Definitions</b>	<b>7</b>
2.1 Finite automata on infinite words . . . . .	7
2.1.1 Nondeterministic automata . . . . .	8
2.1.2 Alternating automata . . . . .	8
2.2 Linear Temporal Logic . . . . .	10
2.3 Extended Temporal Logic . . . . .	11
<b>3 ETL to NBW</b>	<b>13</b>
3.1 Nondeterministic Embedding . . . . .	13
3.2 Negation Normal Form . . . . .	16
3.3 $ETL_f$ to alternating Büchi automata . . . . .	17
3.4 $ETL_l$ into alternating Büchi automata . . . . .	20
3.5 Alternating to Nondeterministic . . . . .	23
3.6 $ETL_r$ to Nondeterministic . . . . .	32
3.6.1 Nondeterministic to Alternating . . . . .	32
3.6.2 Construction of alternating automaton . . . . .	33
3.6.3 Alternating to Nondeterministic . . . . .	37
<b>4 ETL with Alternating Automata</b>	<b>43</b>
4.1 ETL with alternating automata . . . . .	43
4.1.1 Definition of $ETL_a$ . . . . .	43
4.1.2 $ETL_a$ to Nondeterministic . . . . .	44

4.2	ETL with 2-way alternating automata . . . . .	47
4.2.1	Definition of $ETL_{2a}$ . . . . .	47
4.2.2	$ETL_{2a}$ to 2-way alternating automata . . . . .	48
4.2.3	Construction of the 2-way alternating Büchi automaton . . . . .	51
4.3	2-way automata to 1-way automata . . . . .	53
4.3.1	Lower bound . . . . .	54
4.3.2	Upper bound . . . . .	55
4.4	Alternating to Nondeterministic . . . . .	61

**5 Summary** **69**