

Contents

1	Introduction	1
1.1	What is a Complex Number?	1
1.2	Arithmetic Operations Involving Complex Numbers	2
1.3	Justification for Complex Binary Number System	2
1.4	What is Complex Binary Number System?	3
	References	4
2	Conversion Algorithms	5
2.1	Conversion Algorithms for Integers	5
2.2	Conversion Algorithms for Fractional Numbers	8
2.3	Conversion Algorithms for Floating-Point Numbers	11
	References	11
3	Arithmetic Algorithms	13
3.1	Addition Algorithm for Complex Binary Numbers	13
3.2	Subtraction Algorithm for Complex Binary Numbers	14
3.3	Multiplication Algorithm for Complex Binary Numbers	15
3.4	Division Algorithm for Complex Binary Numbers	17
3.5	Effect of Shift-Left Operations on Complex Binary Numbers	19
3.6	Effect of Shift-Right Operations on Complex Binary Numbers	21
	References	22
4	Arithmetic Circuits Designs	23
4.1	Adder Circuit for Complex Binary Numbers	23
4.1.1	Minimum-Delay Adder	23
4.1.2	Ripple-Carry Adder	34
4.1.3	State-Machine Adder	37
4.1.4	Implementations and Performance Evaluations	41

4.2	Subtractor Circuit for Complex Binary Numbers	44
4.2.1	Minimum-Delay Subtractor	44
4.2.2	Implementations	54
4.3	Multiplier Circuit for Complex Binary Numbers	55
4.3.1	Minimum-Delay Multiplier	55
4.3.2	Implementations	65
4.4	Divider Circuit for Complex Binary Numbers	66
4.4.1	Minimum-Delay Divider	66
	References	76
5	Complex Binary Associative Dataflow Processor Design	77
5.1	Review of Complex Binary Number System	77
5.2	What is Associative Dataflow Concept?	78
5.3	Complex Binary Associative Dataflow Processor	80
5.4	Australian Innovation Patent No. 2010100706	81
	References	81
6	Conclusion and Further Research	83



<http://www.springer.com/978-81-322-0853-2>

Complex Binary Number System

Algorithms and Circuits

Jamil, T.

2013, XII, 83 p. 11 illus., Softcover

ISBN: 978-81-322-0853-2