

Table of Contents

Foreword	v
Conference Committee	vii
List of Referees	ix
History of IEEE Meetings on Computer Arithmetic	xi

Session 1: Number Systems

(Chair: James E. Robertson, University of Illinois)

1.1 On a Tapered Floating Point System	2
<i>Aqil M. Azmi, University of Colorado, and Fabrizio Lombardi, Texas A&M University</i>	
1.2 Implementing Infinite Precision Arithmetic	10
<i>Jerry Schwarz, AT&T Bell Laboratories</i>	
1.3 Software Implementation of Sli Arithmetic	18
<i>Peter R. Turner, US Naval Academy</i>	

Session 2: On-Line Arithmetic—I

(Chair: Mary Jane Irwin, Penn State University)

2.1 n-Line CORDIC Algorithms	26
<i>Haixiang Lin, IBBC-TNO, and Henk J. Sips, Delft University of Technology</i>	
2.2 Design of an On-Line Multiply-Add Module for Recursive Digital Filters	34
<i>Ralph H. Brackert, Jr., M.D. Ercegovac, and Alan N. Wilson, Jr., University of California, Los Angeles</i>	
2.3 Design of On-Line Division Unit	42
<i>Paul K.-G Tu and Milos D. Ercegovac, University of California, Los Angeles</i>	

Session 3: Function Generation, Division, and Square Root

(Chair: Naofumi Takagi, Kyoto University, Japan)

3.1 Efficient Elementary Function Generation with Multipliers	52
<i>Hassan M. Ahmed, Boston University</i>	
3.2 An Accurate, High Speed Implementation of Division by Reciprocal Approximation	60
<i>D.L. Fowler and J.E. Smith, Astronautics Corporation of America</i>	
3.3 Algorithm for High Speed Shared Radix 8 Division and Radix 8 Square Root	68
<i>Jan Fandrianto, Integrated Information Technology, Inc.</i>	

Session 4: Adders and Convolvers

(Chair: William McAllister, Hewlett-Packard)

4.1 Polyphase Convolvers	78
<i>Luigi Dadda, Politecnico di Milano</i>	
4.2 Analysis and Design of CMOS Manchester Adder with Variable Carry-Skip	86
<i>Pak K. Chan and Martine D.F. Schlag, University of California, Santa Cruz</i>	
4.3 Optimal Group Distribution in Carry-Skip Adders	96
<i>Silvio Turrini, Digital Equipment Corporation</i>	

Session 5: On-Line Arithmetic – II

(Chair: Tomas Lang, University of California, Los Angeles)

5.1 JANUS, an On-Line Multiplier/Divider for Manipulating Large Numbers	106
<i>Alain Guyot, Yvan Herreros, Laboratoire TIM3-IMAG, and Jean-Michel Muller, CNRS</i>	
5.2 Some Results about On-Line Computation of Functions	112
<i>Jean Duprat, Yvan Herreros and Jean-Michel Muller, Laboratoire LIP-IMAG</i>	
5.3 Exploiting Redundancy in Bit-Pipelined Rational Arithmetic	119
<i>Peter Kornerup, Odense Universitet, and David Matula, Southern Methodist University</i>	

Session 6: Floating-Point Arithmetic

(Chair: George Taylor, MIPS)

6.1 Higher Radix Floating Point Representations	128
<i>Paul Johnstone, Telerate Systems Incorporated, and Frederick E. Petry, Tulane University</i>	
6.2 Contiguous Digit Sets and Local Roundings	136
<i>Marko Petkovsek, University of Ljubljana</i>	
6.3 Redundant Logarithmic Number Systems	144
<i>M.G. Arnold, T.A. Bailey, J.R. Cowles and J.J. Cupal, University of Wyoming</i>	

Session 7: Square Root and Division

(Chair: Tony Carter, University of Utah)

7.1 On the Efficient Implementation of Higher Radix Square Root Algorithms	154
<i>Paolo Montuschi and Luigi Ciminiera, Politecnico di Torino</i>	
7.2 Radix-4 Square Root without Initial PLA	162
<i>Milos D. Ercegovac and Tomas Lang, University of California, Los Angeles</i>	
7.3 On-the-Fly Rounding for Division and Square Root	169
<i>Milos D. Ercegovac and Tomas Lang, University of California, Los Angeles</i>	

Session 8: Processors

(Chair: Stewart G. Smith, VLSI Technology, E.U.R.L.)

8.1 Rounding Algorithms for IEEE Multipliers	176
<i>Mark R. Santoro, Gary Bewick, and Mark A. Horowitz, Stanford University</i>	
8.2 Cascade: Hardware for High/Variable Precision Arithmetic	184
<i>Tony M. Carter, University of Utah</i>	
8.3 Algorithm Design for a 30 Bit Integrated Logarithmic Processor	192
<i>David M. Lewis and Lawrence K. Yu, University of Toronto</i>	

Session 9: Residue Arithmetic

(Chair: Renato Stefane, III, Politecnico di Milano, Italy)

9.1 O(logN) Architectures for RNS Arithmetic Decoding	202
<i>K.M. Elleithy, M.A. Bayoumi, and K.P. Lee, University of Southwestern Louisiana</i>	
9.2 Incompletely Specified Numbers in the Residue Number System – Definition and Application	210
<i>Dragan Gamberger, Ruder Boskovic Institute</i>	

9.3 Systolic Arrays for Integer Chinese Remaindering	216
<i>Cetin K. Koc, University of Houston, and Peter R. Cappello, University of California, Santa Barbara</i>	
Session 10: Optical Arithmetic, Error Detection, and Encoding	
(Chair: Jean-Michel Muller, Ecole Normale Supérieure de Lyon)	
10.1 Optical Arithmetic Using High-Radix Symbolic Substitution Rules	226
<i>Kai Hwang and D.K. Panda, University of Southern California, Los Angeles</i>	
10.2 Concurrent Error Detection in Arithmetic and Logical Operations Using Berger Codes	233
<i>Jien-Chung Lo, University of Rhode Island, Suchai Thanawastien, and T.R.N. Rao, University of Southwestern Louisiana</i>	
10.3 Lexicographic Encoding of Numeric Data Fields	241
<i>Naphtali Rishe, Florida International University</i>	
Author Index	247