Abstract

In this paper, a new number system "Single Digit Triple Base Number System (SDTBNS)" using 2, 3 and 5 as the bases have been introduced. Advantages of SDTBNS over Single Digit Double Base Number System (SDDBNS) have been discussed here. Dynamic range of the numbers represented in SDTBNS has also been dealt with in details. Analysis on complexity of the multiplication unit and execution time reveal the novelty of the proposed number system. Application of this number system in digital signal processing (DSP) has been explored and an efficient implementation of linear convolution has been presented.

References

Representations,&quot; Proc. ASAP &apos;95, Strasbourg, France.
- A. Avizienis, &quot;Signed-digit Number Representation for Fast Parallel
Arithmetic;&quot;, IRE Trans. Electronic Computer
- V. S. Dimitrov, G. A. Jullien and W. C. Miller, &quot;An Algorithm for Modular
- T. N. Shorey and R. Tijdeman, &quot;Exponential Diophantine Equations,
- S. S. Pillai, &quot;On the equation 2a - 2b = 3c – 3d &quot;; Bulletin of the
- V. Dimitrov and T. V. Cooklev, &quot;Two algorithm for modular exponentiation based
on nonstandard arithmetic;&quot;; IEICE Transactions on Fundamentals of Electronics,
issue on cryptography and information security.
- J. A. Solinas, &quot;Low-weight binary representations for pairs of integers;&quot;;
Center for Applied Cryptographic Research, University of Waterloo, Waterloo, ON, Canada,
- J. Adikari, V. Dimitrov and L. Imbert, &quot;Hybrid Binary-Ternary Joint Sparse Form
and its Application in Elliptic Curve Cryptography;&quot;; Draft, July 2, 2008, supported by the
Natural Science and Engineering Research Council of Canada.
- D. Hankerson, A. Menezes and S. Vanstone, Guide to Elliptic Curve Cryptography,
- Pavel Sinha, Amitabha Sinha, Krishanu Mukherjee and Kenneth Alan Newton,
&quot;Triple Base Number Digital and Numerical Processing System;&quot;; Patent filed

- S. Sadeghi-Emamchaie, G. A. Jullien, V. S. Dimitrov and W. C. Miller, &quot;Digital
Arithmetic using analog Arrays;&quot;; Proc., Eighth Great Lakes Symp. on VLSI, pp. 202-207,
L. L. , Feb. 98.
- S. Maitra, A. Sinha, &quot;A Single Digit Tripple Base Number System – A New
Concept for Implementing High Performance Multiplier Unit for DSP Applications;&quot;;
Proceedings of the sixth International Conference on Information, Communication and Signal
- S. Maitra, A. Sinha, &quot;Architecture of Mixed Radix Number System –A New
Approach of Designing Digital Filter;&quot;; proceedings of the 10th IASTED International
Conference on Signal and Image Processing(SIP2008), August, 18-20,2008, Kailua-Kona, HI,
U. S. A.

Index Terms

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SDTBNS  SDDBN    DSP  FIR Filter  DFT  DIT  Linear Convolution  FFT