

Arithmetic Operators Introducing Full Swing High Speed Current-Mode BiCMOS Technology

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Abstract

In this paper we present some multiple valued arithmetic operators introducing high-speed current mode circuits. By applying simple and efficient methods we have reduced the number of transistors and power dissipation. Besides we have achieved a significant improvement in terms of speed and chip area. We have eliminated some parts of circuits and simulated their function with other parts, which results in so many improvements already mentioned.

References

- [1] K. Navi, A. Kazeminejad and D. Etiemble, "Performance of CMOS Current Mode Full Adders", *IEEE Proc. Int'l. Symp. Multiple Valued Logic*, May 1994, pp 27-34.
- [2] K. Navi and D. Etiemble, "From Multi-Valued Current Mode CMOS Circuits to Efficient Voltage Mode CMOS Arithmetic Operators", *IEEE Proc. Int'l. Symp. Multiple Valued Logic*, May 1995, pp 58-64.
- [3] A. Arfaee and K. Navi and M. Kazemi Parsa and A. Akbari, "Design of High speed 2's complement MAC Unit Using Redundant Number System", *6th Annual Computer Society of Iran Computer Conf.*, Esfahan, 2001.
- [4] David A. Hodges, Resve Saleh, Horace G. Jackson, *Analysis and Design of Digital Integrated Circuits*, 3rd Edition, Mc-Graw Hill, 2004.
- [5] Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, *Digital Integrated Circuits*, 2nd Edition, Prentice Hall, 2002, ISBN: 0130909963.
- [6] Sabih H. Gerez, *Algorithms for VLSI Design*, John Wiley 1999.
- [7] Chris Christopher Saint, Judy Saint, *IC Mask Design Essential Layout Techniques*, Mc-Graw Hill 2002.
- [8] Wai Kai Chen, *The VLSI Hand Book*, IEEE Press 2000.
- [9] M. Michael Vai, *VLSI Design*, CRC 2001.
- [10] James B. Kuo, JEA Honglou, *Low - Voltage CMOS VLSI Circuits*, John Willy 1999.
- [11] A. Kazeminejad, K. Navi and D. Etiemble, "CML Current mode full adders for 2.5-V power supply", *IEEE Proc. Int'l. Symp. Multiple valued Logic*, May 1994, pp 10-15.
- [12] Temel T., A. Morgül, "Implementation of Multi-valued Logic Gates Using Full Current mode CMOS Circuits", *Analog Integrated Circuits and Signal Processing*, KAP, Vol. 39, No. 2, pp. 191-204, 2004.

- [13] Temel T., *Current-mode CMOS Design of Multi-valued Logic Circuits*, Ph.D Thesis, Bogazici University, Dep. of Electrical and Electronics Engineering, 2002.
- [14] Morgul A., Temel, Turgay, “A New Level Restoration Circuit for Multi-valued Logic”, *Proc. of IEEE ISCAS'04*, pp-649-652, May 2004, Vancouver, CA.
- [15] Sung-Mo (Steve) Kang, Yusuf Leblebici, *CMOS Digital Integrated Circuits Analysis & Design*, 3rd Edition, Swiss Federal Institute of Technology, Mc-Graw Hill, 2003, ISBN: 0072460539.
- [16] Chih-Liang Chen, “2.5 m BiCMOS Technology”, *IEEE Journal of Solid-State Circuits*, Vol. 27, No. 4, Apr 1992.

Թվաբանական օպերատորների միջոցով լրիվ լայնույթով բարձր արագության ընթացքային տեսակի BiCMOS տեխնոլոգիայի ներմուծում

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Ամփոփում

Սույն հոդվածում մենք ներկայացնում ենք բազմակի արժեքներով թվաբանական օպերատորներ՝ ներմուծելով բարձր արագության ընթացքային տեսակի շղթաներ: