DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
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MST: A Modified Svoboda-Tung Division Algorithm

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Abstract: The development of a new general radix-b division algorithm, based on seminal ideas proposed by Svoboda and Tung, suitable for VLSI implementation is presented. The new algorithm overcomes the drawbacks of the Svoboda-Tung techniques that have prevented the VLSI implementation. First of all, the proposed algorithm is valid for any radix $b \geq 2$; and next, it avoids the possible compensation due to overflow on the iteration by re-writing the two most significant digits of the remainder. This simplifies both the generation of the multiples of the divisor and the quotient digit selection function. An analysis of the algorithm shows that a known radix-2 and two recently published radix-4 division algorithms are particular cases of this general radix-b algorithm. Finally, since the new algorithm is valid only for a reduced range of the IEEE normalised divisor, a pre-scaling technique, based on the multiplication of both the operands by a stepwise approximation to the reciprocal of the divisor is also presented.

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