基于最大逼近角的固定旋转序列 CORDIC 算法

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摘　要：　为了解决现有 CORDIC 算法旋转序列不固定、算法复杂度高、需要的存储空间大等问题,基于最大逼近角理论对算法加以优化,设计了一种固定旋转序列的 CORDIC 算法结构.通过对角度重编码后二进制的高位旋转策略的分析,确定了对高位每一位都进行两次旋转的固定序列的方法,从而减少了高位旋转方向判断次数，简化了比例常数的计算.最后在 FPGA 中实现对优化前后算法的实验对比分析,验证了优化后的算法相比传统算法在计算复杂度、存储空间使用以及误差控制等方面的优越性和有效性.

关键词：　CORDIC 算法；最大逼近；固定旋转序列；FPGA

Fixed rotation sequence CORDIC algorithm based on

maximum approximation angle

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Abstract：　In order to solve the problems of irregular rotation sequence, high complexity and large storage space in traditional CORDIC algorithm, a CORDIC algorithm structure with fixed rotation sequence is designed based on the theory of maximum approximation angle. By analyzing the strategy of binary high bit rotation after angle re-coding, the method of fixed sequence which rotates each bit twice is determined, which reduces the number of judgments of high bit rotation direction and simplifies the calculation of proportional constant. Finally, the experimental comparison and analysis of the optimization algorithm before and after implementation in the FPGA verifies the superiority and effectiveness of the optimized algorithm compared with the traditional algorithm in the aspects of computational complexity, storage space usage and error control.

Key words：　CORDIC algorithm; maximum approximation angle,; fixed rotation sequence; FPGA