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An Analysis of Interpolation Implementation for LNS Addition and Subtraction Function in Positive Region

Abstract

Interpolation is among of the most popular approach used in approximating the values in logarithmic number system (LNS) arithmetic design. This method that often combines with lookup tables (LUTs) manages to produce efficient LNS design in area, latency and accuracy. Current research proves that the combination of interpolators with co-transformation in LNS subtraction had shown extreme improvements in terms of speed and area, which is comparable to floating point (FLP) performance. Taking the advantage, this research had been conducted to analyze the implementation of these three interpolators, which are Taylor, Lagrange and modified Lagrange, in a 32-bit environment of the LNS addition and subtraction procedures with the first-order co-transformation in positive region. The designs were analyzed in two categories, which are the accuracy towards FLP and the total memory consumption. The best interpolator was selected based on the most optimum area consumption design with manageable accuracy in FLP limit. The outcome of this analysis could benefit further improvements in LNS design.

Keywords

Accuracy; Addition; First order co-transformation; Floating point; Interpolator; Logarithmic number system; Memory consumption; Positive region; Subtraction