

Abstract

# Positive-noise Affine Interval Arithmetic

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This paper proposes a new method to approximate range values of nonlinear functions, called a positive-noise affine interval, in which each range is represented by a linear formula consisting of positive noise symbols and their classical interval coefficients. Each positive noise symbol is evaluated to  $[0,1]$ , where a noise symbol in an (extended) affine interval is evaluated to  $[-1,1]$ . Although the modification is simple, by applying Chebyshev approximation, we frequently obtain a more precise linear approximation, especially when two arguments of an arithmetic operation share the same noise symbols. We observe the comparison by experiments of a roundoff error analysis with our previous using with extended affine intervals.

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