

Harmonic And Intermodulation Performance Of Analogue-To-Digitalconverters With Multibit Errors And Additive Dither

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Summary

This paper presents a simple approach for mathematical modelling of real analogue-to-digital converters (ADCs) with multibit errors and dither. Using this model, expressions are obtained for the harmonic and intermodulation performance of a real ADC excited by a multisinusoidal signal. While these expressions involve infinite summations, they always converge. The special case of a two-tone half-scale equal-amplitude input signal to a real ADC is considered in detail and it is shown that the infinite summations can be converted into finite ones in this special case. Numerical results obtained from a 5-bit ADC are presented and discussed. The results show that while all forms of dither will linearise the staircase characteristic of the ADC, thus improving its intermodulation performance, they may degrade its harmonic and intermodulation performance resulting from the multibit errors. The feasibility of cancellation of output harmonic and intermodulation products is discussed

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