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Research Article

Diophantine Frequency Synthesizer Design for Timekeeping Systems

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Abstract

Diophantine Frequency Synthesis (DFS), a number-theoretic approach to frequency synthesizers, was introduced in 2006. Further work concerning DFS spectral purity was addressed and reported at the 2007 European Frequency and Time Conference. This paper is on the implementation of nested DFS architectures for large timekeeping systems. We have shown that DFS does not impart spectral impurity in comparison to commonly used high resolution frequency synthesizers. Here we describe a design approach for 10 MHz synthesizers with spectral purity ranging ± 10 Hz. The synthesizers generate their output from a phase-locked loop, which is essential to accomplishing precision frequency correction in timekeeping systems.

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