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Rethinking IIR filters as part of real-time pulsar astronomy

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Abstract content
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The interstellar medium between the observer and a pulsar under investigation can be modeled as a cold plasma which alters the characteristics of electromagnetic radiation emitted by a pulsar event. Dispersion and scattering effects, which primarily contribute to the altered electromagnetic characteristics, ultimately influence our ability to detect pulsar events. In this paper we propose, for the first time, an infinite impulse response filter to correct for the aforementioned effects in real-time. Computational improvements over existing finite impulse response solutions are demonstrated using an FPGA implementation. A new possibility of trading elastic storage space for reduced computational complexity is further presented.

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