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Temporal switching for pulsed wave applications

Amir Shlivinski[(1)] and Yakir Hadad[(2)*]
(1) Ben-Gurion University, Beer Sheva, Israel; e-mail: amirshli@ee.bgu.ac.il;
(2) Tel-Aviv University, Tel-Aviv, Israel; e-mail: hadady@eng.tau.ac.il

As opposed to periodic time modulation that can be used for narrowband signal manipulations, temporal discontinuities introduce a venue for pulsed, ultra-wideband, signal engineering. In this presentation we will explore our work in the last few years in this direction. Specifically, we will discuss the concept of pulsed impedance matching beyond the Bode-Fano criterion [1], and the concept of absorption for pulsed waves beyond Rozanov bound [2]. These two bounds are obtained as a result of the assumption that the wave system is linear and time-invariant. By revoking this underlying assumption, one may potentially go beyond these bounds. Obviously however, not any time-varying design will perform better than an optimized LTI design. And moreover, the design of time-varying wave systems is highly unintuitive. In the presentation we will go through the basic intuition that leads to our preliminary designs, and later we will describe the optimizations process that was applied to get the required performance. We will elaborate on the effect of imperfections in the switching process, for example, the effect of a gradual soft switching as opposed to fast abrupt switching [3].

References

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