

The Positive Side of Filters

L. Farina

Abstract

Positive systems are systems in which the relevant variables assume only positive (or nonnegative) values. This class of systems is ubiquitous - for instance - in biology, economy, chemistry or population ecology, just to mention a few. In fact, positivity is a direct consequence of the basic fact that we are dealing with some kind of "resource" measured by a quantity: a positive number.

In this talk, I will illustrate how positivity could play a fundamental role also in the field of signal processing, by introducing two recent technologies: Charge Routing Networks (a charge coupling device - CCD) and active fiber optics filtering using optical amplifiers.

In the last case, positivity stems from the fact that the signals are modulated as intensity variations on optical carriers, while in the first case, from the fact that quantities of electrical charge move across a semiconductor substrate.

Finally, I will illustrate a "positive filter" design procedure based on recent theoretical results on the positive realization problem.