

AUTOMATIC DETECTION OF THE COMMON AND NON-COMMON FREQUENCIES IN CONGRUENT DISCRETE SPECTRA – A THEORETICAL APPROACH

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Rezumat. Eșantionarea unui semnal variabil în timp și analiza sa spectrală sunt activități supuse unor constrângeri teoretice precum teorema lui Shannon și limitarea obiectivă a rezoluției în frecvență. Uzual, reprezentările spectrale sunt prelucrate și interpretate de un specialist care, se presupune, are suficiente informații anterioare despre semnalele monitorizate pentru a concluziona, de exemplu, asupra frecvențelor semnificative. Pe de altă parte, prelucrarea și interpretarea spectrelor semnalelor pot fi activități de rutină ce trebuie să fie automatizate folosind produse software adecvate (aplicații PC). În acest context, lucrarea prezintă bazele teoretice ale unei metode intuitive de abordare practică a detectării (automate) a frecvențelor comune și necomune din două sau mai multe spectre congruente.

Abstract. Both sampling a time-varying signal, and its spectral analysis are activities subjected to theoretically compelling, such as Shannon's theorem and the objectively limiting of the frequency's resolution. Usually, the spectral representations are processed and interpreted by a scientist who, presumably, has sufficient prior information about the monitored signals to conclude on the significant frequencies, for example. On the other hand, processing and interpretation of signals' spectra can be routine tasks that must be automated using suitable software (PC application). In the above context, the paper presents the theoretic bases of an intuitive and practical approach of the (automatic) detection of the common and non-common frequencies in two or more congruent spectra.

Keywords: Signals' analysis; frequencies spectrum; automation process

1. Introduction

Our paper is neither about time-varying signal's sampling and/or his spectral analysis, these specialized subjects being fully analyzed in a lot of very good theoretical works as [1] – [10], nor about some possible algebraic structures and/or other involved mathematical aspects applicable on a set of congruent spectra.

We only theoretically develop (and propose) a practical method dedicated to help the experimenter in a quickly (and automatically) identification of the common and non-common frequencies existing in two or more congruent discrete spectra. A method which uses, to conclude on the significant frequencies, an intuitive discernment criterion based on the magnitudes of the spectral lines, namely: *the more important frequency in signal has the greater magnitude among the spectral lines.*

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