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Bernard Picinbono, *Fellow, IEEE* and Pascal Bondon, *Member, IEEE*

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be obtained from to the author at the
following address :
bernard.picinbono@lss.supelec.fr

Abstract—The second-order statistical properties of complex signals are usually characterized by the covariance function. However, this is not sufficient for a complete second-order description, and it is necessary to introduce another moment called the relation function. Its properties, and especially the conditions that it must satisfy, are analyzed both for stationary and nonstationary signals. This leads to a new perspective concerning the concept of complex white noise as well as the modeling of any signal as the output of a linear system driven by a white noise. Finally, this is applied to complex autoregressive signals, and it is shown that the classical prediction problem must be reformulated when the relation function is taken into consideration.

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B. P. and P. B. with the Laboratoire des Signaux et Systèmes (L2S), a joint laboratory of the C.N.R.S. and the École Supérieure d'Électricité, Plateau de Moulon, 3 rue Joliot-Curie 91192, Gif sur Yvette, France. The L2S is associated with the University of Paris-Sud, France. E-mail: bernard.picinbono@lss.supelec.fr, .