On resistor-induced thermal noise in linear circuits

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Abstract— In a previous correspondence, M. Vargas and R. Pallas-Areny [ibid., vol. 45, p. 345, 1996] showed that the thermal noise introduced by a resistor in any linear circuit will ultimately decrease with the value of the resistance R, to explain some paradoxical behavior on certain active circuits. Here it is shown how this result, although correct for every physical network, has some noticeable breakdowns for ideal networks and, consequently, in some limit conditions that are worthwhile considering. Moreover, with the same hypothesis needed for the theoretical correctness of the results, more general considerations are possible and have been investigated.

Index Terms— Analog circuits, circuit analysis, circuit noise, sensitivity.

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