Abstracts

Plotting Impedances with Negative Resistive Components (Correspondence)

The plotting of impedances with negative resistive components on some sort of inverted Smith chart is becoming more common. This note suggests standardizing on a particular form, for psychological reasons. The suggested form is represented by "Gamma" = 1/Gamma, where Gamma is the actual complex reflection coefficient, and "Gamma" is the value plotted on the chart. The corresponding impedance relation is "Z/Z/sub 0/"=-Z/sub 0//Z. The advantages claimed for this particular form are: 1) The transformation is analytic as opposed to the one mentioned by Stock and Kaplan. 2) If both negative and positive resistances are being plotted on two Smith charts, the result, as shown in Fig. 1, looks like the representation of the world on the covers of some atlases. It fits well with the concept of projection on the unit sphere. 3) It follows from 1) that if impedance is being plotted as a function of real frequency, then points of stability or instability as indicated by complex frequency will fall on the same side of the curve on both charts. A possible disadvantage is the opposite sense of rotation of the two charts for transmission-line calculations, but this seems natural and easy to remember for two circles in "contact."

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