The Best Linear Approximation and Linearisation

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Linearisation is omnipresent in the analysis of non-linear systems. On this poster, the link between two different linearisation techniques is explored: On the one hand, there is the Best Linear Approximation (BLA) which is can be considered as a linearisation of the large-signal behaviour of the system [1]. On the other hand, we have the small-signal linearisation around a steady-state solution of the non-linear system. The BLA is used to model input-output behaviour of dynamic systems, while the second linearisation is often encountered in stability analysis [2].

A Combination both linearisation techniques is encountered in high-frequency measurements when the BLA is determined with an additional small-signal tickler excitation [3]. The extra tickler signal allows to determine the BLA out-of-band or to estimate the BLA of systems with multiple inputs.

When combining the theoretical frameworks of the different techniques, some interesting analogies and assumptions were discovered, which will be detailed.

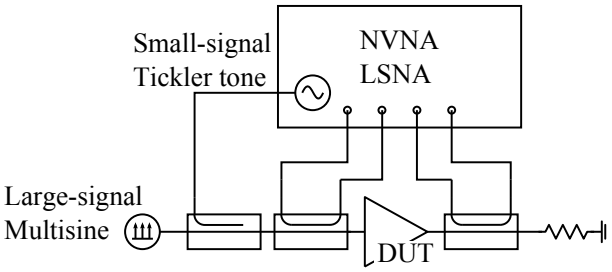

Figure 1: High frequency measurement set-up where the internal small signal source of a network analyser is used to determine the BLA of an amplifier under test [3].

[1] R. Pintelon and J. Schoukens, *System Identification a frequency domain approach*, 2nd ed. John Wiley & Sons, Inc., 2012.

[2] A. Suarez and R. Quere, *Stability analysis of nonlinear microwave circuits*. Artech House, 2002.

[3] W. Van Moer and Y. Rolain, "Measuring the out-of-band best linear approximation," *Measurement Science and Technology*, vol. 21, 2009.

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