Combining the Large and the Small Determining the BLA with tickler tones

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Why small signals together with large signals?





High-frequency PA measurement set-up

Typical output spectrum

Can we use the small-signal to determine the BLA?



Large signal: classic expressions for the BLA $Y^{[3]}(\omega_{ms}) = U(\omega_{ms}) \sum_{\substack{k_1 = -F \\ k_1 = -F}}^{F} |U(k_1\omega_0)|^2 H_3(\omega_{ms}, k_1\omega_0, -k_1\omega_0) \quad \text{Coherent Contributions}$ $+ \sum_{\substack{k_1 = -F \\ k_2 \neq -k_1}}^{F} \sum_{\substack{k_2 = -F \\ k_2 \neq -k_1}}^{F} H_3(k_1\omega_0, k_2\omega_0, \omega_{ms} - k_1\omega_0 - k_2\omega_0) U(k_1\omega_0) U(k_2\omega_0) U(\omega_{ms} - k_1\omega_0 - k_2\omega_0) \quad \text{Non-Coherent Contributions}$

Small-signal: Linearisation around time-varying operating point



$$Y^{[3]}(\omega_{\epsilon}) = U(\omega_{\epsilon}) \sum_{k_{1}=-F}^{F} |U(k_{1}\omega_{0})|^{2} H_{3}(\omega_{\epsilon}, k_{1}\omega_{0}, -k_{1}\omega_{0})$$

Only coherent Contributions

corresponds to BLA for random-phase multisines

Simulation example



The small-signal can be used, but only with random phase multisines



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