Study on Spatial IM3 Suppression By Feed Weight Tuning In An Amplifier-Antenna System in Transmission Modelled With Load-Pull

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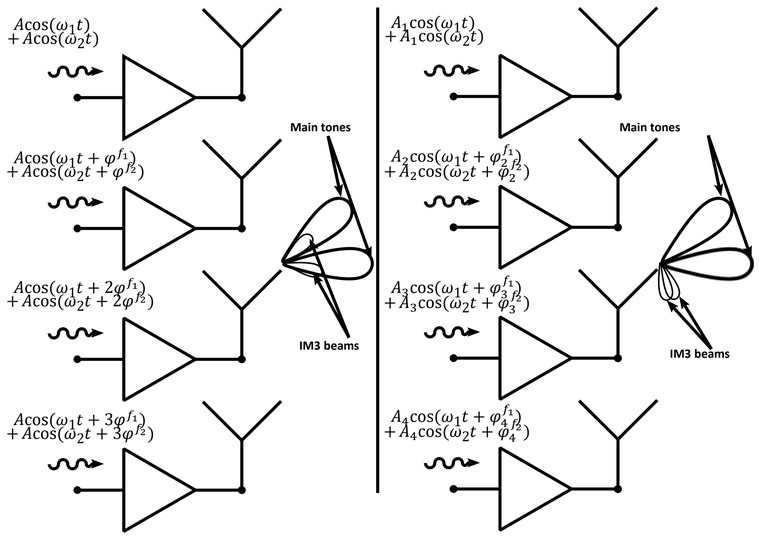
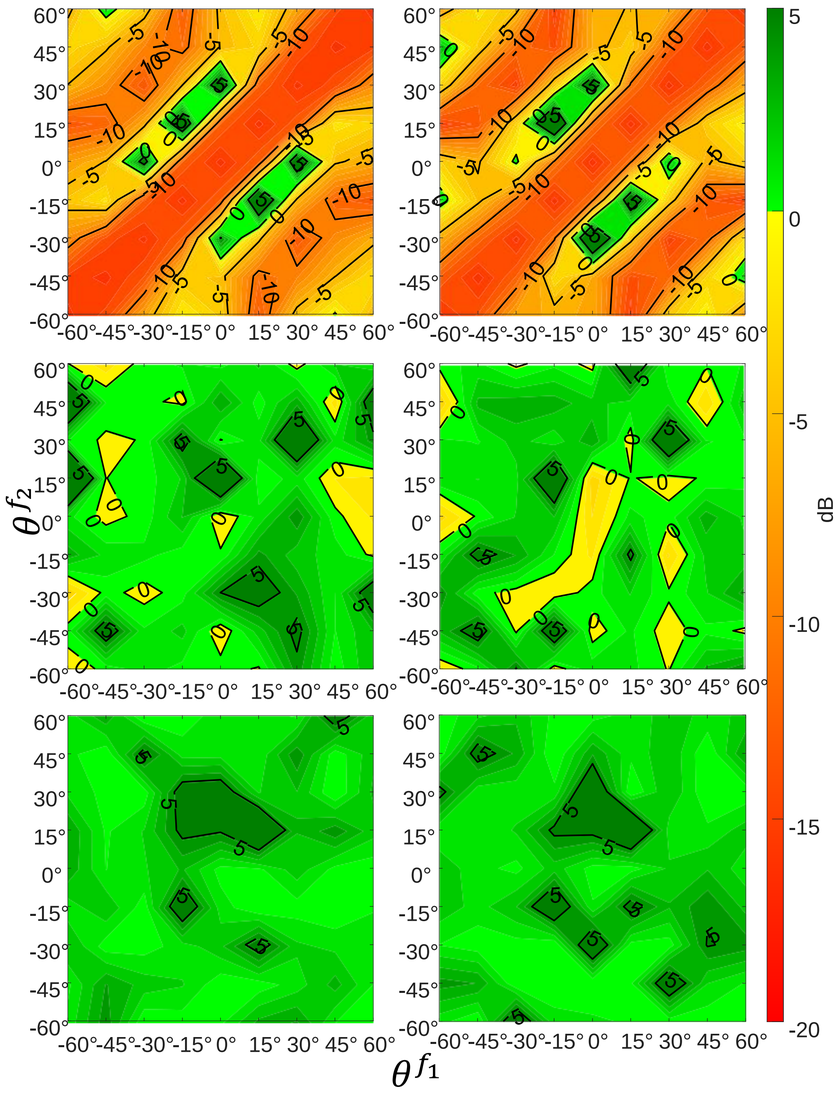


Concept for IM3 suppression.

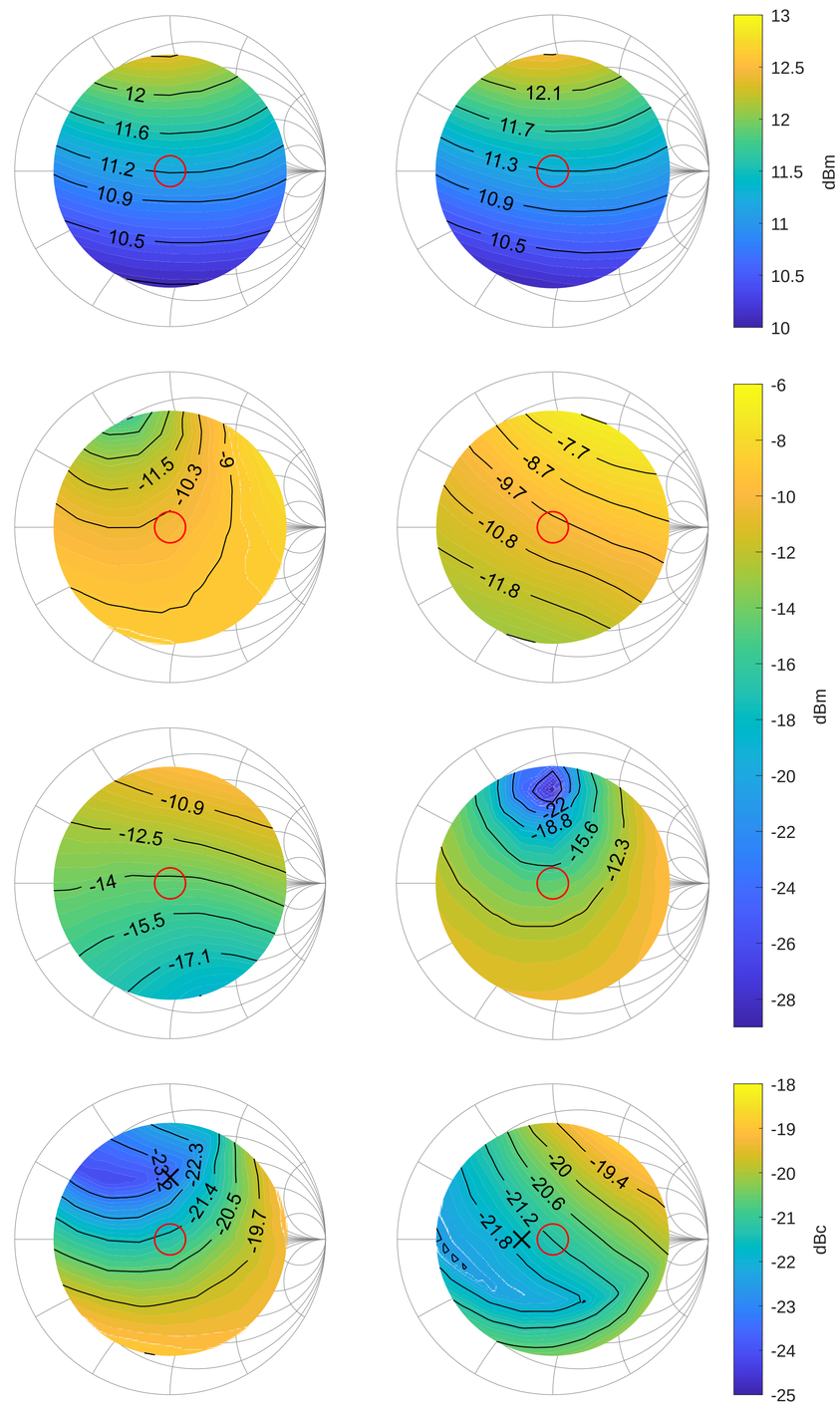
IM3 suppression in transmission by tuning amplifier feeding weights was studied with simulations. The load-pulled model achieved generally a 10-dB improvement in signal-to-IM3 ratio (SI3R) in radiated far-field when compared to linear reference feeding while decreasing the main tone radiated powers by 0.3 dB. The model not accounting for load-pull had a maximum error of 2.5 dB in SI3R.

Feed weight tuning distorts the radiation patterns. Beamwidths and sidelobe levels increase, which is a trade-off not delved into in this study. Lower SI3R requirement with additional optimization targets for pattern characteristics would alleviate this problem.

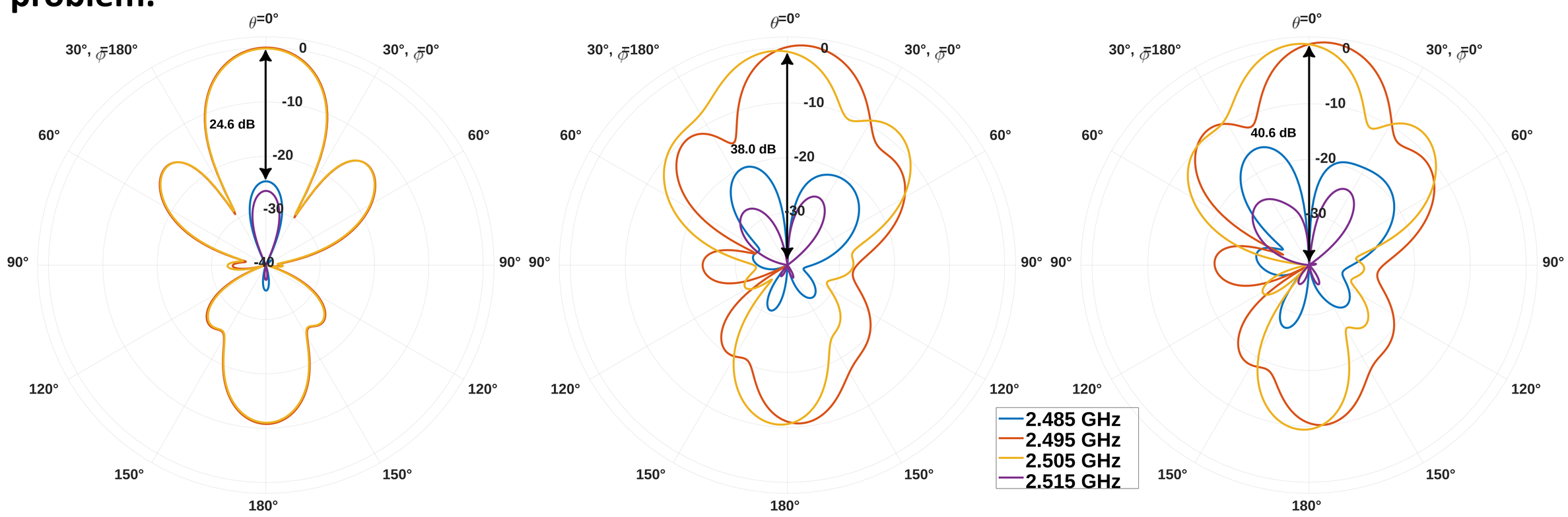


SI3R levels for 2.495 GHz (left column) and 2.505 GHz (right). Results are normalized to 40 dB, SI3R limit. Top row is linear reference, middle is optimized matched amplifier model and bottom is optimized load-pull accounted model.

The used antenna was linear array with matching to 50 Ω and amplifier was a commercial package. In the future, the effect of matching network and antenna structure to the behavior of the IM3 radiation characteristics. Also taking into account the effect of IM3 matching is considered.



Load-pull contours at 1 dB below P1dB total input power. 2.495 GHz (left column) and 2.505 GHz (right column) main tone output impedances were swept one at a time while keeping the other matched. First, second and third rows are powers in b2-waves of main tones, IM3L and IM3H, respectively, and bottom is the IM3-to-carrier ratio.



Example patterns of both beams pointing towards broadside. Linear reference (left), non-linear reference with matched amplifier model (center) and load-pull accounted model (right). Results are normalized to the maximum of the plot on the left.