Research Paper Reference Library

A document summarizing basic concepts and research papers in electromagnetics, metasurfaces, antennas, and RF/microwave engineering

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SECTION 1

Antennas

[1] Generalized Friis Transmission Formula Using Active Antenna Available Power and Unnamed Power Gain (2024)

- Yet to read...

1.1 Patch Antennas

[2] Design of an Inset Feed Rectangular Microstrip Patch Antenna (2021)

- Has list of equations needed
- Contains good expression for the length of the inset needed

[3] Inset Fed Microstrip Patch Antenna for X-Band Applications (2018)

- Has list of equations needed

[4] Design of Inset Feed Microstrip Patch Antenna for Bluetooth Application (2017)

- Has list of equations needed

[5] A design rule for inset-fed rectangular microstrip patch antenna (2010)

- Has list of equations needed

1.2 Leaky-Wave Antennas

[6] Solution to the broadside problem and symmetry properties of periodic leaky-wave antennas (2016)

- Best source for the fundamnetals of periodic leaky-wave antennas

1.2.1 Reconfigurable LWAs

SECTION 2

Metasurfaces

[7] Ultrathin Huygens Transmitarray with High Transmission Efficiency for Single-Layer Metalens Antenna Applications (2024)

- Yet to read...

2.1 Optically-Transparent Metasurfaces

[8] Optically Transparent Antennas and Filters: A Smart City Concept to Alleviate Infrastructure and Network Capacity Challenges (2019)

- Good information on the need/relevance for transparent wireless devices
- Shows history and development of transparent antennas
- Transparent antennas were developed initially for window-embedded applications
- An emerging application is for satellite communications
- Two main categories for transparent antennas: (1) Meshed. (2) Thin-film
- Meshed antennas: antennas made with regular conductors (like copper) but with patterns and holes to allow light to pass through. The performance (gain, return loss, efficiency) is usually smaller than its counterpart. Transparency can be calculated as $T = (A_{\text{solid}} - A_{\text{mesh}})/A_{\text{solid}}$
- Thin-film antennas: these use transparent conductive oxides (TCOs), polymers, conductive inks, and things along these lines. ITO is the most popular TCO used but indium shortages are expected in the near future.
- For TCOs, the transparency is greater with thinner films, but the conductivity is better for thicker films, so there is a tradeoff.

[9] Experimental Demonstration of High Optically Transparent Reflectarrays Using Fine Metal Line Structure (2022)

- Yet to read...

[10] Optically Transparent Series-Fed Microstrip Array With Small Inter-Element Spacing and Stepped Feed-Lines for Antenna-on-Display (2024)

- Yet to read...

SECTION 3

RF and Microwave Circuits

3.1 Ring Resonators

3.2 Phase Shifters

Bibliography

[1] K. F. Warnick, F. Broyde, L. Jelinek, M. Capek, and E. Clavelier, *Generalized friis transmission formula using active antenna available power and unnamed power gain*, 2024. arXiv: 2401.13775 [physics.class-ph]. [Online]. Available: https://arxiv.org/abs/2401.13775.

[2] "Design of an inset feed rectangular microstrip patch antenna," in *2021 IEEE Asia-Pacific Conference on Applied Electromagnetics (APACE)*, 2021, pp. 1–4. DOI: 10.1109/APACE53143.2021.9760620.

[3] T. Karnataka, "Inset fed microstrip patch antenna for x-band applications," *IJERECE*, vol. 5, no. 7, 2018.

[4] B. Ratish, S. Sandipan, R. Shankha, and D. Avishek, "Design of inset feed microstrip patch antenna for bluetooth application," *IRJET*, vol. 4, no. 3, 2017.

[5] M. A. Matin and A. Sayeed, "A design rule for inset-fed rectangular microstrip patch antenna," *WSEAS TRANSACTIONS on COMMUNICATIONS archive*, vol. 9, pp. 63–72, 2010. [Online]. Available: https://api.semanticscholar.org/CorpusID:14682457.

[6] S. Otto, "Solution to the broadside problem and symmetry properties of periodic leaky-wave antennas," en, Dissertation, Universität Duisburg-Essen, 2016, Ph.D. dissertation, Duisburg, Essen, 2016. [Online]. Available: https://duepublico.uni-due.de/servlets/DocumentServlet?id=41640.

[7] L. Bu, Y. Cai, H. Ma, *et al.*, "Ultrathin huygens transmitarray with high transmission efficiency for single-layer metalens antenna applications," *IEEE Antennas and Wireless Propagation Letters*, pp. 1–5, 2024. DOI: 10.1109/LAWP.2024.3431029.

[8] R. B. Green, M. Guzman, N. Izyumskaya, *et al.*, "Optically transparent antennas and filters: A smart city concept to alleviate infrastructure and network capacity challenges," *IEEE Antennas and Propagation Magazine*, vol. 61, no. 3, pp. 37–47, 2019. DOI: 10.1109/MAP.2019.2907895.

[9] B. Chen, B. Wu, H.-R. Zu, J.-Q. Hou, and T. Su, "Experimental demonstration of high optically transparent reflectarrays using fine metal line structure," *IEEE Transactions on Antennas and Propagation*, vol. 70, no. 11, pp. 10 504–10 511, 2022. DOI: 10.1109/TAP.2022.3195461.

[10] J. Myeong Heo, K. Kim, J. Choi, and G. Byun, "Optically transparent series-fed microstrip array with small inter-element spacing and stepped feed-lines for antenna-on-display," *IEEE Access*, vol. 12, pp. 99 684–99 692, 2024. DOI: 10.1109/ACCESS.2024.3419844.