**Negative Capacitors with Floquet Engineering**

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Negative capacitors have been a long-sought goal in electromagnetics to break fundamental limits, such as the Bode-Fano limit in matching networks or the Chu limit in antennas. Such capacitors can be realized through non-Foster circuits based on transistors, however with problems on stability and noise. Recently, several works have explored the possibility of breaking fundamental limits through time modulation, to take advantage of the superior noise performance of such networks compared to transistor networks. However, such works have focused on expanding the bandwidth of specific structures, without addressing the fundamental question of realizing negative capacitors that would provide a general solution for breaking bounds in various scenarios.

In this work, we present an approach for realizing negative capacitors based on periodic time modulation. The proposed approach realizes networks with a negative-residue impedance pole at zero frequency, as should be the case with negative capacitors. We also show that the proposed approach satisfies the fundamental capacitor equation *Q* = *CV* with *C* < 0 for excitation with static voltages. In other words, we show that application of a static voltage *V* results in the induction of a negative charge *Q*, as would be expected in a negative capacitor. We demonstrate this approach in various scenarios, including excitation with static and harmonic sources. Furthermore, we analyze the use of proposed approach in matching of capacitive loads and show how it significantly improves the matching bandwidth compared to the Bode-Fano limit. Our work addresses a fundamental question in electromagnetics and opens possibilities for improving the performance of systems in electromagnetics and other disciplines.