Tensor-Maxwell Approach for Disrupting Computational Complexity in Advanced Waveform and Antenna Simulations
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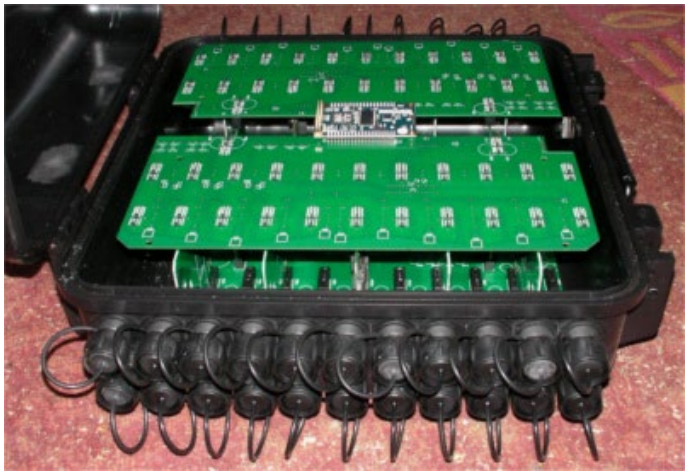
Endless Generative Waveforms Program

CONCEPT

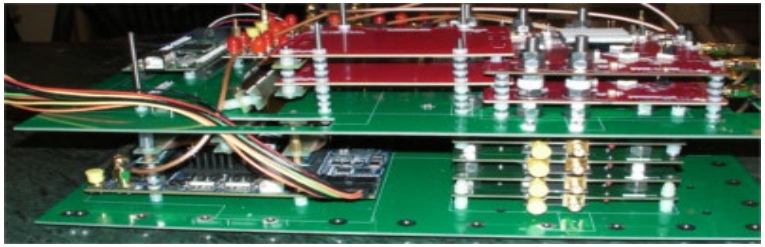


APPROACH

We employ tensor approximations of magnetic and electric fields for the numerical modeling of Maxwell's equations. This approach enables the solution of both forward and inverse modeling problems with sublinear computational complexity relative to the number of discretization points. As a result, antenna optimization and the formation of complex electromagnetic waveforms can be performed without reliance on high-performance supercomputers.

IMPACT

We aim to apply our expertise in tensor modeling from GPR development to optimize the design of antenna arrays, including the determination of the optimal signal polarization form, enhancing overall system efficiency.



CONTEXT

The proposed method was initially applied to optimizing the configuration of ground-penetrating radar (GPR) antennas, which our company developed and manufactured under contract. These advancements allowed us to create three-dimensional profiles of geological structures at depths of several hundred meters.

For the EndLess program, we plan to leverage this expertise to generate electromagnetic waveforms that not only adapt effectively to the landscape but also maximize information transmission within a given radiation intensity.

Source Selection Information