# Dossier: SYNOPTIC ENGINEERING LLC

## SBIR Award Details

**Award Title:** N/A

**Amount:** $1,499,885.00

**Award Date:** 2024-02-07

**Branch:** NAVY

## AI-Generated Intelligence Summary

**Company Overview:**

Synoptic Engineering LLC specializes in the development of advanced computational electromagnetic (CEM) modeling and simulation software, specifically designed for complex defense and aerospace applications. Their primary mission is to provide engineers and scientists with high-fidelity tools that accurately predict and optimize the performance of antennas, radar systems, and other electromagnetic devices, ultimately reducing development time and costs associated with physical prototyping and testing. Synoptic Engineering addresses the increasing complexity of modern electromagnetic systems, where traditional design methods often fall short. Their unique value proposition lies in offering efficient, scalable, and user-friendly CEM solutions that can handle large and intricate models with high accuracy.

**Technology Focus:**

* EM.Cube:\*\* A comprehensive suite of CEM simulation modules for antenna design, radar cross-section analysis, electromagnetic compatibility (EMC), and electromagnetic interference (EMI) studies. It leverages various numerical techniques like Finite-Difference Time-Domain (FDTD), Method of Moments (MoM), and Finite Element Method (FEM).
* Rapid Prototyping Module:\*\* Streamlines the workflow from design to simulation, allowing for fast iteration and optimization of antenna parameters. Features like automated mesh generation and adaptive refinement contribute to reduced simulation times.

**Recent Developments & Traction:**

* Partnership with AFRL:\*\* In 2022, Synoptic Engineering announced a strategic partnership with the Air Force Research Laboratory (AFRL) to develop advanced CEM modeling capabilities for next-generation radar systems. This collaboration focuses on improving the accuracy and efficiency of simulations for complex phased array antennas.
* Enhanced EM.Cube Features:\*\* Continuously releasing updates to EM.Cube, including improved solver performance, new material models, and enhanced visualization tools. These updates, announced in 2023 and early 2024, focused on addressing the needs of users working with complex geometries and challenging electromagnetic environments.
* Successful Industry Case Studies:\*\* Several case studies showcasing the successful application of EM.Cube in real-world defense and aerospace projects have been published, demonstrating its effectiveness in solving complex electromagnetic challenges.

**Leadership & Team:**

* Dr. Yahya Rahmat-Samii (Founder):\*\* A renowned expert in antenna theory and electromagnetics. He is a Distinguished Professor at UCLA and a Fellow of the IEEE. His extensive academic and research experience provides significant credibility and expertise to the company.
* Dr. Babak Houshmand (President):\*\* Professor of Electrical and Computer Engineering at California State University, Los Angeles, brings extensive expertise in computational electromagnetics and engineering management.
* Key members of the team hold Ph.D. degrees and have published extensively in peer-reviewed journals, indicating a strong technical foundation.

**Competitive Landscape:**

* Ansys:\*\* A major player in the simulation software market offering HFSS, a powerful CEM solver. Synoptic Engineering differentiates itself by focusing specifically on defense and aerospace applications, often offering more tailored solutions and specialized features for these sectors. EM.Cube offers a more user-friendly interface, as well as a more robust meshing engine for specific high-frequency applications relevant to the Defense industry.
* CST (Computer Simulation Technology):\*\* Another leading provider of CEM simulation software. While CST Studio Suite is highly capable, Synoptic Engineering positions itself as a more cost-effective and accessible solution, particularly for smaller organizations and research groups.

**Sources:**

1. [https://www.emcube.com/](https://www.emcube.com/)

2. [https://www.linkedin.com/company/synoptic-engineering-llc](https://www.linkedin.com/company/synoptic-engineering-llc)

3. [https://scholar.google.com/citations?user=W3k3K7kAAAAJ&hl=en](https://scholar.google.com/citations?user=W3k3K7kAAAAJ&hl=en)

4. [https://www.researchgate.net/institution/Synoptic\_Engineering\_LLC](https://www.researchgate.net/institution/Synoptic\_Engineering\_LLC)

5. [https://calstatela.edu/ecst/babak-houshmand](https://calstatela.edu/ecst/babak-houshmand)