Opportunity
The design and optimization of complex power systems is complicated by the numerous possible interactions between the system's components and the difficulty of determining the optimal set of system parameters to satisfy design requirements. The problem is compounded for dynamic systems, whose interactions constantly change with time. Argonne National Laboratory is analyzing and simulating complex power systems to facilitate the design process.

Description of Work
Argonne's Technology Development Division specializes in system analysis and simulation problems for advanced power system applications. Argonne's combination of expertise and unique in-house computing tools has addressed complex system problems for the U.S. Department of Energy (DOE), the Air Force, and the National Aeronautics and Space Administration (NASA). Argonne can also devise realistic, visual interfaces and link them to simulations, providing accurate visual representation and interaction with modeled prototypes.

Benefits
Designing and evolving optimal complex power systems requires expertise and flexible tools able to handle arbitrary system configurations, support rapid prototyping, handle arbitrary system constraints, and integrate effectively with other software tools. The same capabilities permit various plant decision trade-offs and operating strategies to be fully explored. Expertise and methodologies developed for DOE, the Air Force, and NASA for design and analysis of advanced power and propulsion systems provide a powerful capability that can be applied to advanced power system problems in the U.S. power industry.

Current Status
In addition to in-house work for governmental agencies, Argonne has recently completed work with NASA Lewis and the Air Force Philips Lab to provide them with system modeling environments based on Argonne methodologies. A similar project with a leading U.S. shipbuilder is expected soon. Argonne has copyrighted some of its modeling software so it can be licensed for outside use.

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