

Z-source Circuit Breaker Use in Naval Power Systems

LCDR William Taft, USN

Prof. James Kirtley
Thesis Supervisor

The integration of the z-source circuit breaker into future naval medium voltage direct current power systems is investigated. Values for a “typical” naval medium voltage direct current system are determined for the development of an electrically-scaled model z-source circuit breaker. The scale model is used to determine the maximum time rate of change of voltage across the thyristor within the circuit breaker to aid in full-scale design. The turn-on transient behavior of the z-source circuit breaker is explored and fault cases that occur during this transient for which protection cannot be shown are discussed. Potential solutions to provide protection in these cases are explored, including circuit modifications, power system layouts, and operational restrictions.

Naval Engineer

Master of Science in Mechanical Engineering