Design Propulsion Electric Power Generation Systems

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Design Propulsion Electric Power Generation
NASA and the U.S. Department of Energy (DOE) have teamed up to fund three design concepts for reactors that could become part of a nuclear thermal propulsion system, a next-generation technology that ...

NASA, DOE fund three nuclear thermal space propulsion concepts
Blue Origin and General Electric Hitachi Nuclear Energy have won contracts by NASA to develop nuclear-powered spacecraft that can travel faster and farther, to Mars and beyond. The Department of ...

Blue Origin, General Electric win NASA contracts to build nuclear-powered spacecrafts
Ultra Safe Nuclear Technologies and its partners are among three teams winning $5 million contracts to develop designs for space nuclear propulsion systems.

USNC-Tech and Blue Origin win a contract for nuclear thermal propulsion design
NASA is leading an effort, working with the Department of Energy (DOE), to advance space nuclear technologies. The government team has selected three reactor ...

NASA Announces Nuclear Thermal Propulsion Reactor Concept Awards
PPE is the foundational element of NASA’s lunar Gateway Maxar Technologies a trusted partner and innovator in Earth Intelligence and Space Infrastructure, today announced that the Power and Propulsion ...

Maxar Completes Power and Propulsion Element Preliminary Design Review
NASA has selected three teams of companies to perform concept studies of nuclear thermal propulsion (NTP) reactors.

NASA issues contracts for nuclear thermal propulsion studies
A battery-electric ... propulsion is based on several precedents. Electric traction motors in diesel locomotives operate at the continuous power rating. To achieve maximum energy conversion efficiency ...

Battery-Electric Tender for Modern Railway Propulsion
future-proof alternative.The conventional approach in ship design has been to use 2-stroke engines for propulsion and 4-stroke engines for electric power generation. The Wärtsilä / RINA ...

Novel Propulsion Arrangement by Wärtsilä and RINA
or by generating onboard electrical power by use of a fuel cell, the focus of GKN Aerospace’s ‘H2GEAR’ program launched earlier this year. Whilst H2GEAR is exploring a liquid hydrogen propulsion ...

GKN Aerospace leads new Swedish National project on hydrogen propulsion
Collins Aerospace completes design review and begins fabrication of a 500-kilowatt electric motor for the composites-intensive aircraft, with flight qualification testing to occur in 2023.

Collins Aerospace ramps up electric motor development for Airlander 10 airship
future-proof alternative.The conventional approach in ship design has been to use 2-stroke engines for propulsion and 4-stroke engines for electric power generation. The Wärtsilä RINA ...

Novel Propulsion by Wärtsilä & RINA Can Deliver Immediate Benefits
IndyGo is now running Allison-equipped electric hybrid buses for Indianapolis Public Transport. (Photo: Business Wire) Allison’s H 40 EP TM electric hybrid propulsion system is paired with the Cummins ...

Allison Transmission and IndyGo Partner to Bring Electric Hybrid Buses to Indianapolis Public Transit
The conventional approach in ship design has been to use 2-stroke engines for propulsion and 4-stroke engines for electric power generation. The Wartsila/RINA arrangement, however, requires just ...

Wartsila: Novel LNG Propulsion Arrangement Can Meet Emission Targets
GLOBAL ANNOUNCEMENT Rapidly moving towards becoming a fully electric car company, Volvo Cars is bringing battery cell technology development and production closer to home and aims to tailor its future ...

Tech Moment - Battery propulsion
Michael Ricci, LaunchPoint CTO, explains how their new hybrid-electric drone battery system regulates a smooth even flow of power to motors.

LaunchPoint Debuts New Hybrid Power Solution to Extend Drone Ranges
Nuclear energy has lost favor in much of the world, but the sky’s the limit when it comes to outer space. The U.S. government is drawing on the expertise of Jeff Bezos’s Blue Origin space venture, ...

Bezos, GE, Lockheed Are Tapped by NASA for Nuclear Space Flight
Enedym, the technology company that develops next generation electric propulsion and electrified powertrains, today announced a $15 million financing round from an international group of strategic ...

Sustainable Electric Motor Company Enedym Inc. Secures $15 Million Investment to Accelerate Business Plan
DUBLIN, June 29, 2021 /PRNewswire/ -- The "Next-Gen Aircraft Propulsion System ... the investments in alternative electric power sources, advancements in next-generation electronic components ...

The future national security environment will present the naval forces with operational challenges that can best be met through the development of military capabilities that effectively leverage rapidly advancing technologies in many areas. The panel envisions a world where the naval forces will perform missions in the future similar to those they have historically undertaken. These missions will continue to include sea control, deterrence, power projection, sea lift, and so on. The missions will be accomplished through the use of platforms (ships, submarines, aircraft, and spacecraft), weapons (guns, missiles, bombs, torpedoes, and information), manpower, materiel, tactics, and processes (acquisition, logistics,and so on.). Accordingly, the Panel on Technology attempted to identify those technologies that will be of greatest importance to the future operations of the naval forces and to project trends in their development out to the year 2035. The primary objective of the panel was to determine which are the most critical technologies for the Department of the Navy to pursue to ensure U.S. dominance in future naval operations and to determine the future trends in these technologies and their impact on Navy and Marine Corps superiority. A vision of future naval operations ensued from this effort. These technologies form the base from which products, platforms, weapons, and capabilities are built. By combining multiple technologies with their future attributes, new systems and subsystems can be envisioned. Technology for the United States Navy and Marine Corps, 2000-2035 Becoming a 21st-Century Force:Volume 2: Technology indentifies those technologies that are unique to the naval forces and whose development the Department of the Navy clearly must fund, as well as commercially dominated technologies that the panel believes the Navy and Marine Corps must learn to adapt as quickly as possible to naval applications. Since the development of many of the critical technologies is becoming global in nature, some consideration is given to foreign capabilities and trends as a way to assess potential adversaries' capabilities. Finally, the panel assessed the current state of the science and technology (S&T) establishment and processes within the Department of the Navy and makes recommendations that would improve the efficiency and effectiveness of this vital area. The panel's findings and recommendations are presented in this report.

The primary human activities that release carbon dioxide (CO2) into the atmosphere are the combustion of fossil fuels (coal, natural gas, and oil) to generate electricity, the provision of energy for transportation, and as a consequence of some industrial processes. Although aviation CO2 emissions only make up approximately 2.0 to 2.5 percent of total global annual CO2 emissions, research to reduce CO2 emissions is urgent because (1) such reductions may be legislated even as commercial air travel grows, (2) because it takes new technology a long time to propagate into and through the aviation fleet, and (3) because of the ongoing impact of global CO2 emissions. Commercial Aircraft Propulsion and Energy Systems Research develops a national research agenda for reducing CO2 emissions from commercial aviation. This report focuses on propulsion and energy technologies for reducing carbon emissions from large, commercial aircraftâ€" single-aisle and twin-aisle aircraft that carry 100 or more passengersâ€"because such aircraft account for more than 90 percent of global emissions from commercial aircraft. Moreover, while smaller aircraft also emit CO2, they make only a minor contribution to global emissions, and many technologies that reduce CO2 emissions for large aircraft also apply to smaller aircraft. As commercial aviation continues to grow in terms of revenue-passenger miles and cargo ton miles, CO2 emissions are expected to increase. To reduce the contribution of aviation to climate change, it is essential to improve the effectiveness of ongoing efforts to reduce emissions and initiate research into new approaches.

High power nuclear electric propulsion systems have the capability to enable many next-generation space exploration applications. To date, use of electric primary propulsion in flight systems has been limited to low-power, solar electric missions. There is a need for a large-scale research and development effort to field systems capable of meeting the demands of future high-power electric propulsion missions, especially missions utilizing nuclear power plants to power electric propulsion systems. In formulating such an effort, it is first important to identify the likely requirements around which such a system might be designed. These requirements can be effectively cast in terms of required thruster lifetime, thrust, specific impulse, output power, and power plant specific power. Projected requirements can be derived based on the mass characteristics of space-borne nuclear power plants, and the optimized trajectories of spacecraft missions enabled by the use of megawatt-level nuclear electric power systems. Detailed mass modeling of space-based Rankine cycle nuclear power plants is conducted to evaluate the achievable specific power of these systems. Based on the figures for specific power so obtained, mission modeling is next conducted using the Mission Analysis Low-Thrust Optimization software package. Optimized thrust, specific impulse and lifetime figures are derived for several missions of interest. A survey of available electric propulsion thrusters is conducted and thruster configurations presenting the lowest developmental risks in migrating to high thruster output power are identified. Design evolutions are presented for three thrusters that would enhance or enable operation at the megawatt level. First, evaluation of projected lifetime for dual-stage gridded ion thrusters is conducted using the CEX2D simulation tool to evaluate the utility of multi-stage gridded ion engines in obtaining the required thruster lifetime for operation at high specific impulse. Next, to evaluate the utility of Hall thrusters operating at high propellant mass flow rate, a numerical thruster model is developed that incorporates the effects of the neutral fluid in predicting thruster performance. Using this code, numerical simulations are conducted to investigate the effects of variations in propellant mass flow rate, magnetic field topology, and thruster channel geometry on achievable performance. Finally, the effects of variations in the channel contour of magnetoplasmadynamic thrusters on performance and efficiency are evaluated using the MACH2 software package. Incremental variations in thruster channel contour are implemented, and the effects of these variations on the performance onset condition, and electrode current distributions are observed. Conclusions regarding the utility of each of these three design evolutions in developing thrusters for multi-megawatt electric propulsion systems are discussed. Contributions stemming from this research include, first, the establishment of an appropriate requirements space for the design of advanced highpower electric power and propulsion systems. This design space is comprised of projected requirements for power plant specific power, derived from power plant mass modeling, and thruster output power, specific impulse and lifetime derived from mission modeling. Additionally, this work provides evaluation, using state-of-the-art simulation suites, of several electric thruster design evolutions of potential utility in developing electric propulsion systems designed to operate at the megawatt level.

Everything you wanted to know about industrial gas turbines for electric power generation in one source with hard-to-find, hands-on technical information.

The only book that covers fundamental shipboard design and verification concepts from individual devices to the system level Shipboard electrical system design and development requirements are fundamentally different from utility-based power generation and distribution requirements. Electrical engineers who are engaged in shipbuilding must understand various design elements to build both safe and energy-efficient power distribution systems. This book covers all the relevant technologies and regulations for building shipboard power systems, which include commercial ships, naval ships, offshore floating platforms, and offshore support vessels. In recent years, offshore floating platforms have been frequently discussed in exploring deep-water resources such as oil, gas, and wind energy. This book presents step-by-step shipboard electrical system design and verification fundamentals and provides information on individual electrical devices and practical design examples, along with ample illustrations to back them. In addition, Shipboard Power Systems Design and Verification Fundamentals: Presents real-world examples and supporting drawings for shipboard electrical system design Includes comprehensive coverage of domestic and international rules and regulations (e.g. IEEE 45, IEEE 1580) Covers advanced devices such as VFD (Variable Frequency Drive) in detail This book is an important read for all electrical system engineers working for shipbuilders and shipbuilding subcontractors, as well as for power engineers in general.

Although propulsion and electric power systems selection is an important part of naval ship design, respective decisions often have to be made without detailed ship knowledge (resistance, propulsors, etc.). Propulsion and electric power systems have always had to satisfy speed and ship-service power requirements. Nowadays, increasing fuel costs are moving such decisions towards more fuel-efficient solutions. Unlike commercial ships, naval ships operate in a variety of speeds and electric loads, making fuel consumption optimization challenging. This thesis develops a flexible decision support tool in Matlab® environment, which identifies the propulsion and ship-service power generation systems configuration that minimizes fuel consumption for any ship based on its operating profile. Mechanical-driven propulsion systems with or without propulsion derived ship-service power generation, separate ship-service systems and integrated power systems are analyzed. Modeling includes hull resistance using the Holtrop-Mennen method requiring only basic hull geometry information, propeller efficiencies using the Wageningen B series and transmission and prime movers fuel efficiencies. Propulsion and ship-service power generation systems configuration is optimized using the genetic algorithm. US Navy's Advanced Surface Ship Evaluation Tool (ASSET) model for the DDG-51 Flight I destroyer was used for modeling validation. Optimal fuel consumption results are compared against the existing configuration for the DDG-51 Flight I destroyer using a representative operating profile.