Project Elara 2024 research and development report

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Abstract

Project Elara is a nonprofit dedicated to creating an unlimited-energy peaceful future over the course of many, many lifetimes. Scientific research is an essential component of the project and the basis of its technological work. In ensuring the full benefits of the research is realized, the project publishes all results and tools openly and works on a nonprofit basis—all work within the Project is dedicated to the public domain. This technical overview details the present research conducted by the Project.

Overview

The Sun is a star, a nuclear furnace with a power output of 3.828×10^{26} W.

Upon application of the boundary conditions, we obtain the weak form for our boundary-value problem, as given by:

$$-\int_{\Omega} (\nabla_J \mathbf{x}' : \nabla_J \mathbf{x}')(\nabla \cdot \tilde{\mathbf{E}})(\nabla \cdot \Phi)\, dA + k^2 \int_{\Omega} \Phi \cdot \tilde{\mathbf{E}}\, d\mathbf{A} + \int_{\partial\Omega} = 0 \tag{1}$$

The derivation of this is found in Appendix A.

Planned upcoming research

Further theoretical work, including a more thorough treatment of the power collection system and theoretical modelling of the power transmission system, is necessary for advancing the research. More detailed studies of orbits and spacecraft design are also hoped for in upcoming work. In addition, construction and testing of physical prototypes to augument computational simulations is also essential. Prototypes are intended to be assembled via 3D printed components treated with electroless plating to form a smooth, metallic coating, after which specific tests may be performed. The verification of such prototypes in an experimental setting is highly anticipated to be carried out in the near future.