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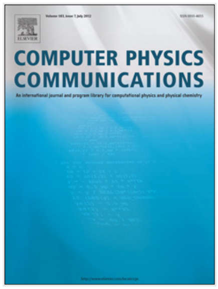

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An Efficient Computational Approach for Evaluating Radiation Flux for Laser Driven Inertial Confinement Fusion Targets

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Abstract

Radiation flux computation on the target is very important for laser driven Inertial Confinement Fusion, and view-factor based equation models [1, 2] are often used to compute this radiation flux on the capsule or samples inside the hohlraum. However, the equation models do not lead to sparse matrices and may involve an intensive solution process when discrete mesh elements become smaller and the number of equations increases.

An efficient approach for the computation of radiation flux is proposed in this paper, in which, 1) symmetric and positive definite properties are achieved by transformation, and 2) an efficient Cholesky factorization algorithm is applied to significantly accelerate such equations models solving process.

Finally, two targets on a laser facility built in China are considered to validate the computing efficiency of present approach. The results show that the radiation flux computation can be accelerated by a factor of 2.

Keywords

Laser-driven inertial confinement fusion, View-factor, Cholesky factorization

1 Introduction

Inertial Confinement Fusion (ICF) is a process in which nuclear fusion reactions are initiated by heating and compressing a fuel capsule containing a mixture of Deuterium and Tritium. Currently, the laser-driven ICF is believed to have promise and has achieved

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