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A hybrid linear-discontinuous spectro-nodal method for one-group unidimensional fixed source discrete ordinates problems with isotropic source

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Nowadays, much attention has been given to the problem of obtaining accurate numerical solutions of fixed source discrete ordinates problems. In this work, we described and tested four different numerical methods to solve one-group unidimensional discrete ordinates problems. First, we derived the Diamond Difference (DD) method, next it's implemented the Linear Discontinuous (LD) and Spectral Green Function (SGF) methods and finally, we obtained the hybrid Linear-Discontinuous Spectro-Nodal (LD-SN) method for discrete ordinates problems. These methods are based on the use of the standard balance equations, which holds in each spatial cell and for each discrete ordinates direction, and consider four different auxiliary equations for the cell-average angular flux. Numerical results of benchmarks are given to illustrate and compare the methods' accuracy. SGF demonstrated be the best method with no spatial truncation errors, follow by LD-SN, LD and DD, respectively. The LD-SN results proved be better than SGF in computational storage and numerical calculation per direction and per iteration.

Keywords: fixed source problems, discrete ordinates, hybrid linear-discontinuous spectro-nodal

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