A MULTI-PURPOSE PSEUDO NLTE SOLVER FOR LARGE SCALE MULTI-DIMENSIONAL PLASMA SIMULATIONS*

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We have developed a simple and fast pseudo Non-LTE code based on a Screened Hydrogenic Model (SHM) with detailed configuration incorporating nl splitting. Making use of a computationally inexpensive modification of the Saha equation, this highly optimized code has demonstrated a good ability to represent Non-LTE plasma conditions.

An inline version of this model has been written which can be run as part of the Gorgon MHD code for non-LTE radiation loss. An offline version, with a greater level of spectral detail including the ion temperature and plasma motion Doppler, the Stark, the self absorption and the lifetime broadening can be used in order to generate synthetic spectra and filtered X-ray images.

In order to handle the amount of data generated by the spectral treatment of the billions of numerical cells constituting a typical Z-pinch simulation grid, an original data structure derived from a self-balancing binary search tree has been developed, enabling the use of Non-LTE DCA calculations in a large scale three dimensional environment for the first time.

The implementation of this model is described in detail and comparisons with a commercial package are offered. Results from Z-pinch simulations performed with the new code are discussed and possible future improvements are presented.

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