Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Nonlinear Model for Thermal Effects in Free-Electron Lasers: Water Bag and Maxwell Velocity Distributions EDUARDO PETER, FELIPE RIZZATO, ANTONIO ENDLER, Universidade Federal do Rio Grande do Sul — This work is an extension of a previously paper produced by our group, in which the nonlinear model to evaluate the role of the space-charge and temperature effects in free-electron lasers has been applied to a water bag distribution. Now, we are interested in other types of velocity distributions and in particular in Maxwell distribution. As in the previous work, we used the concept of compressibility, in a way that its discontinuities, which are equivalent to the discontinuities in the electron density, make possible to estimate the time of the breakdown of particles laminar flow in high-gain regimes with parameters that maximize the laser growth rate. Through wave-particle simulations, we analyze how the mixing processes for water bag and Maxwell distributions occur. Results of particle-wave simulations are compared with the results obtained via nonlinear model.

Eduardo Peter
Universidade Federal do Rio Grande do Sul

Date submitted: 24 Jul 2015 Electronic form version 1.4