Degree-of-freedom reduction for nonlinear N-Body wave-particle interaction applied to time domain simulations

Damien F. G. Minenna (CNES/AMU/TED)

- Degree-of-freedom involved in plasma is
  - One major issue for N-Body simulations
  - Limiting numerical exploitations

- But to study wave-particle interactions, we want
  - Time domain regime
    - Oscillations, reflections, …
  - Nonlinear regime
    - Trapping, chaos, …
  - Momentum conservation

- For simulations of beam-plasma system-like, we want
  - Accuracy with
    - Interaction time from nanoseconds to milliseconds
    - Long medium from centimetres to metres
  - Fast runs
    - Few minutes only (with my 7 years old computer!)

cnes CENTRE NATIONAL D'ÉTUDES SPATIALES
Aix*Marseille université
PIIM
THALES

Degree-of-freedom reduction for nonlinear N-Body wave-particle interaction applied to time domain simulations

Damien F. G. Minenna (CNES/AMU/TED)

- Yes we can!
- Drastic degree-of-freedom reduction of fields
  - For periodical structures
- Self-consistent hamiltonian dynamics
  - Symplectic integrator

CENTRE NATIONAL D'ÉTUDES SPATIALES