Contribution ID: **59** Type: **poster**

LCODE: quasistatic code for computationally heavy problems of plasma wakefield acceleration

Wednesday, 16 September 2015 20:00 (30 minutes)

LCODE is a freely-distributed code for simulating plasma wakefield acceleration, notable for its numerical stability, performance optimizations and bundling an extensive set of in-built diagnostics.
Using the quasistatic approximation it calculates the plasma response and the particle beam evolution in either axisymmetric or plain 2D geometry. The beam is modelled with fully relativistic macro-particles in a simulation window copropagating with the light velocity. The plasma can be modelled by either kinetic or fluid model. Substepping is used to selectively decrease the simulation steps, increasing the accuracy when it is required. These and various other techniques are used to obtain exceptional numerical stability and precision while simultaneously being light on resources, enabling LCODE to simulate the evolution of long particle beams over long propagation distances.
A recent upgrade allowed LCODE to perform the calculations in parallel. A pipeline of several LCODE instances communicating via MPI (Message Passing Interface) is capable of executing multiple time steps of the simulation in a single pass. This approach can be used to speedup the calculations by hundreds of times.
Upgrades for a laser beam driver and fully 3D simulations are in progress.

Primary author: SOSEDKIN, Alexander (Novosibirsk State University)

Presenter: SOSEDKIN, Alexander (Novosibirsk State University)

Session Classification: Poster Session 2 (WG5-WG6-WG7) and Wine

Track Classification: WG6 - Theory and simulations