Lawrenceville Plasma Physics, Inc

High technology research, development and consulting in plasma physics, X-ray sources, and Focus Fusion

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LPP Announces New Collaboration Agreement with Plasma Simulations Group, University of Toyama, Japan—Simulation Yields First Results

On January 15, 2013, Lawrenceville Plasma Physics Inc., (LPP) and the Plasma Simulation Group, Graduate School of Science and Engineering, University of Toyama, Japan, signed an agreement to collaborate on scientific work on the dense plasma focus and aneutronic fusion, concentrating on simulation of the plasma focus process. This is the second in a series of collaboration agreements LPP is arranging to create a coordinated network of plasma focus and aneutronic fusion researchers throughout the world. The agreement will be administered by Dr. Takayuki Haruki of the Plasma Simulation Group (PSG) and Eric J. Lerner, Chief Scientist at LPP. As with other collaboration agreements, the goal is to speed the achievement of cheap, clean, safe and unlimited energy.

Since the PSG has worked on simulations in this field for a long time, they were able to produce a preliminary simulation in a just few weeks. This simulation, presented at the Sokendai Asian Winter School on Jan. 29-Feb. 1, 2013 at NIFS, Toki, Japan, (http://www-nsrp.nifs.ac.jp/aws/index.shtml) is a first approximation of the process that leads to the formation of plasmoids in a plasma focus device. Plasmoids are dense knots of plasma where the atomic nuclei are heated to high temperatures and fusion reactions occur. They form when filaments of electric current first merge with each other into a single central filament which then twists and knots itself into a plasmoid. LPP itself is working on a simulation of the formation of the filaments during a single pulse of the plasma focus device.

This initial simulation shows four filaments merging into a single filament, forming small dense hot spots. (See figure 1) They then explode apart. The simulation models in three dimensions clouds of nuclei (ions) and electron as they move through the plasma, creating and being moved by complex electric and magnetic fields.

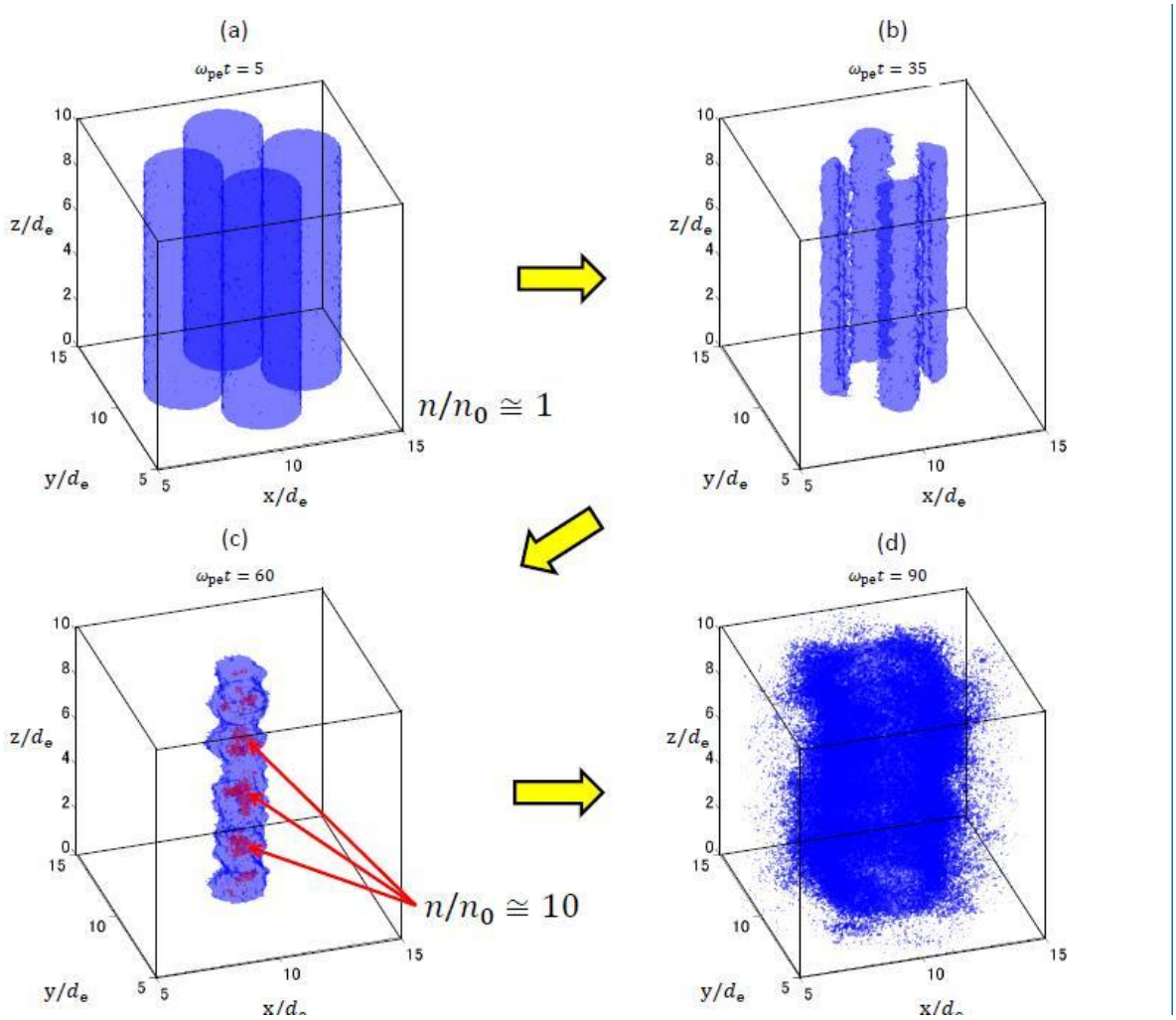

Figure 1. This simulation, an early result of the new collaboration between LPP and PSG, shows four filaments of electric current (blue cylinders, above left) merging into a single filament with dense hot spots (red blobs, below left) before disintegrating.

This initial simulation involves several simplifications in order to rapidly test the program. In future simulations, which are already in progress, the filaments will have more realistic, helical shapes, and will merge with each other in pairs before merging into a single filament. Considerable work remains to be done before the simulations can actually help guide experiments now in progress at LPP. But LPP and PSG are confident that rapid progress can be made now that ongoing interactions between experimental and simulation results are possible through the new collaboration agreement.