

TECH-X

SIMULATIONS EMPOWERING
YOUR INNOVATIONS

TECH-X Overview (For Discussion with OSG)

Tech-X Corporation

www.txcorp.com



Overview

- Tech-X in a nutshell
- SBIR program changes
- Change in actions
- Some ideas on how we could use OSG

Tech-X Corporation Facts

- ~47 people, 2/3 PHDs, Boulder, Colorado
- Founded in 1994
- 220 SBIRs from DOE, NASA and DOD, 74 Phases II
- Participants of SciDAC projects (leading FACETS)
- <http://www.txcorp.com>

Relevant Areas of Expertise

- High-performance computational software for research and engineering simulation and design
- Enhancing code performance through porting to modern hardware (GPUs, MIC)
- High-performance visualization and graphical user interfaces
- Middleware for systems integration and real time data distribution

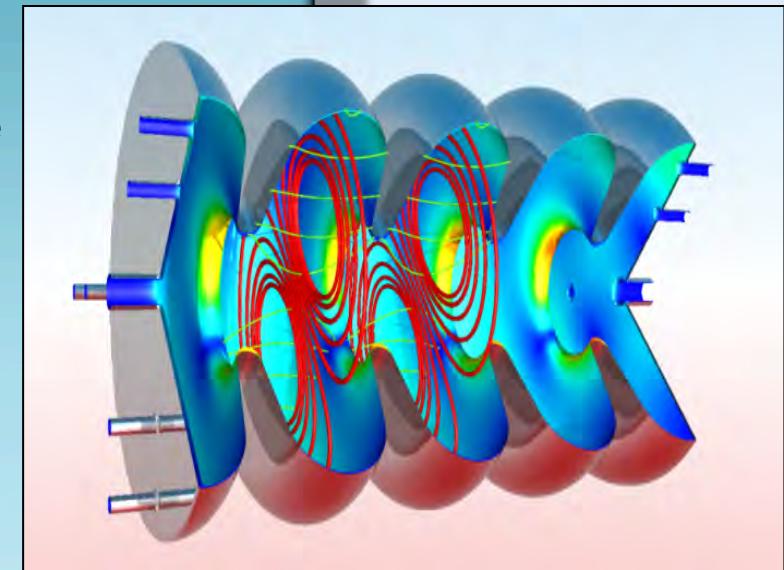


Tech-X Advantage: High Performance and High Quality

- Cutting edge algorithms for cutting edge hardware (hundreds of thousands of cores and GPU)
- Cross-platform support for ease of deployment
- Scientific approach combined with industry strength testing and validation

VSim Product: Electromagnetic and Kinetic Plasma Modeling

- VSim for Electromagnetic solutions
 - Antennas
 - Accelerator cavities
 - Photonic devices
- VSim for Microwave Devices
 - S-parameters
 - Multipacting impacts on performance
- VSim for Plasma Discharges
 - Plasma processing
 - Plasma medical devices
- VSim for Plasma Accelerator
 - Laser-plasma wakefield acceleration
 - Beam-plasma acceleration



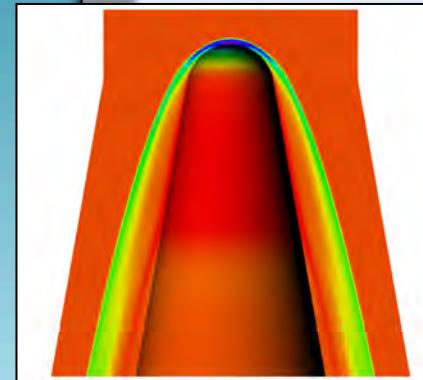
Usim Product: Fluid and Plasmas Modeling Based on Multifluid Approach and Unstructured Meshes

- USim Hypersonics

- Navier-Stokes with anisotropy
- Reaction chemistry
- Multiple species
- Real gas equation of state
- General equation of state

- USim High Energy Dense Plasmas

- Gas dynamic MHD
- Separate evolution of electrons and ions
- General equation of state
- Full Maxwell's equations



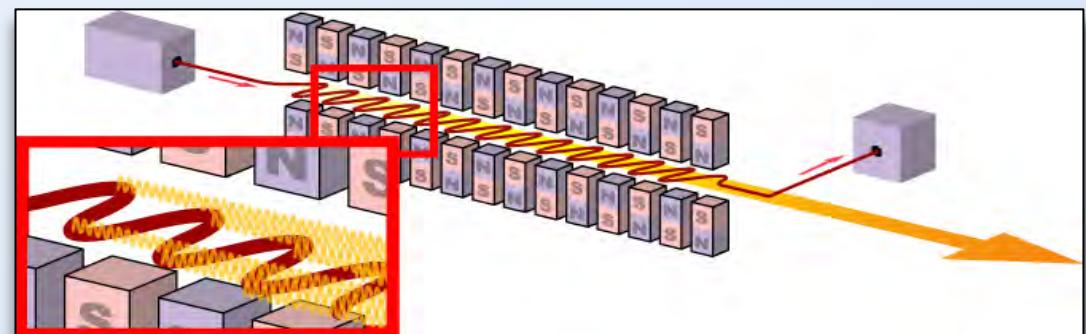
Services: Performance Enhancement

Analysis and Problem Definition

- Performance analysis
- Algorithm and code design review
- Feasibility and impact studies

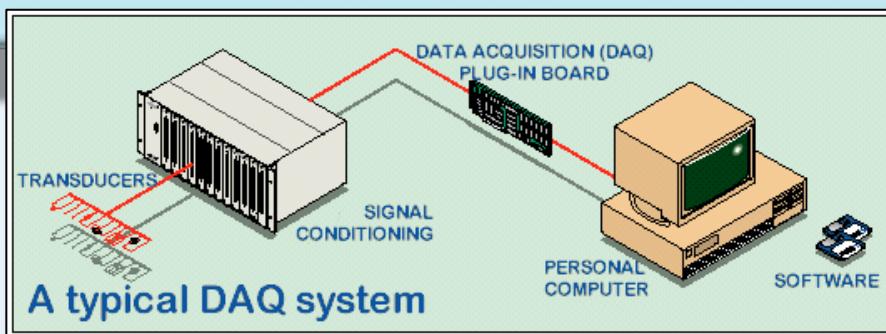
Implementation and optimization

- CUDA, OpenCL, or OpenMP acceleration
- Accelerate IDL programs with GPUlib



Services: DDS for Systems Integration and Real Time Data Distribution

- Data Distribution Service for peer-to-peer Real Time data exchange (components integration, new generation control systems, robotics and information awareness)
 - OMG standard for mission critical systems
 - Python implementation of DDS for ease of prototyping and integration with analysis tools



Market Segments

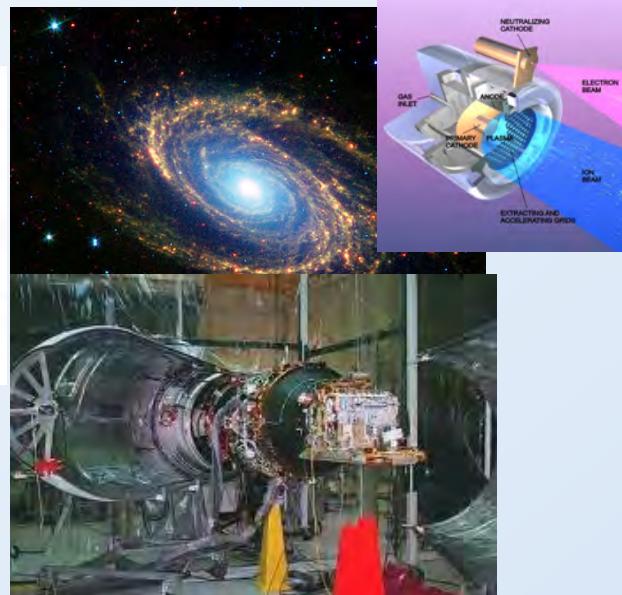
- Electromagnetics



- Plasma processing



- Space physics



- Defense



- Research / education



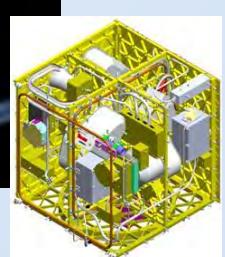
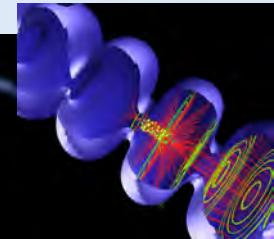
- Software development / testing

```

#pragma once
#ifndef __MSC_VER > 1000
#endif // __MSC_VER > 1000
#ifndef __AFXWIN_H
#error include "afxwin.h"
#endif
#include "resource.h" // See DMotionApp.h for the implementation
class CDMotionApp : public CWinApp
{
public:
    CDMotionApp();
    // Overrides
    // ClassWizard generated virtual function overrides
    //{{AFX_VIRTUAL(CDMotionApp)
    public:
        virtual BOOL InitInstance();
    }}AFX_VIRTUAL

    // Implementation
    //{{AFX_MSG(CDMotionApp)
    //}}AFX_MSG
    // NOTE: - DO NOT EDIT OR DELETE THIS LINE -
    //{{AFX_MSG_MAP(CDMotionApp)
    //}}AFX_MSG_MAP
};

```

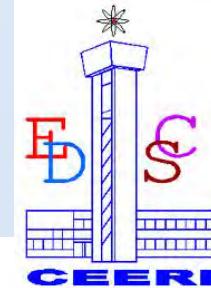


Customers

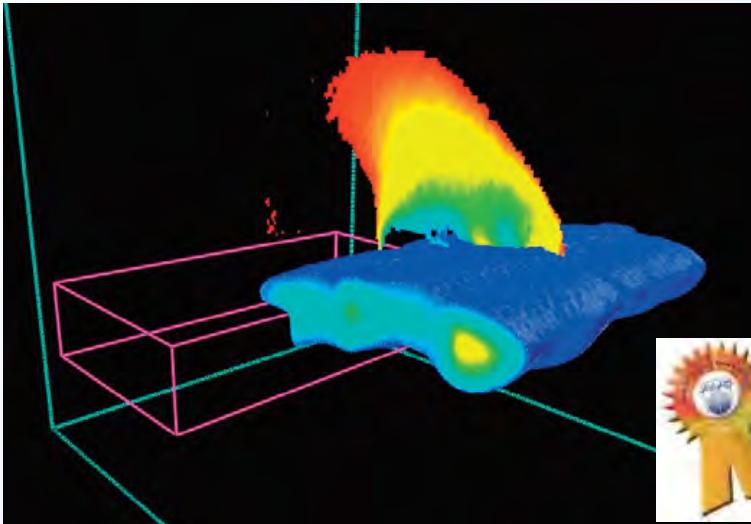
We provide our customers with both off-the-shelf and customized solutions addressing their advanced technology needs.

**ONERA**

THE FRENCH AEROSPACE LAB

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Scientific Recognition

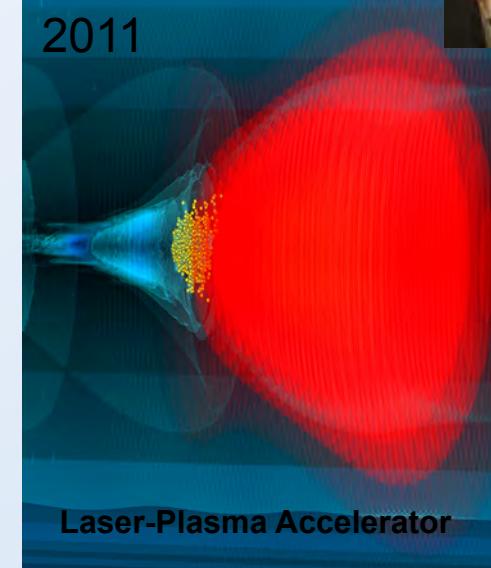
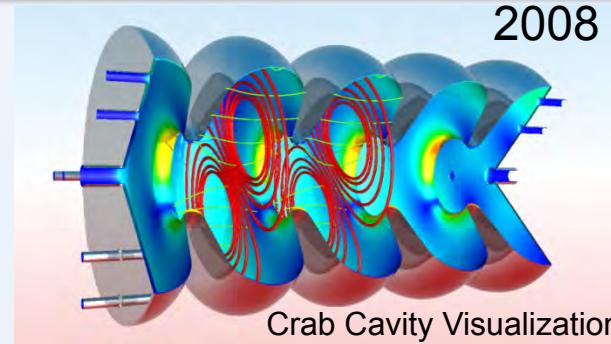


AVS Innovation Award



Far reaching discoveries

Vorpal is the VSim engine: a multi-physics simulation software for modeling the interaction of matter with electromagnetic fields.



Department of Energy
Visualization Awards

Partners and Collaborators

Our partners and collaborators are at the leading edge of science and technology. They represent a broad spectrum of efforts to discover, describe, predict and exploit the complex behaviors of matter and energy.



Changes in DOE SBIR Program (2011)

- DOE instituted 10 proposal per company
- Emphasis on commercialization
 - An industry reviewer separate from technical reviewers
 - Commercialization score going back in time (changing the rules of game a posteriori)
- Idiosyncrasy of the program
 - The majority of topics is pretty much same (coming from the labs and hard to commercialize)
 - Expectations of 10 fold return (VC approach)

We Reacted to These Changes

- Shifting from DOE SBIR to other efforts
 - Commercialization
 - Consulting
 - Sales
 - Non-DOE SBIR (NASA and DOD)
 - Non-SBIR grants
- Reduction (47 from 70 people)
- Different choices of proposals to pursue
- Splitting the portfolio:
 - Applications-> Tech-X
 - Data and infrastructure-> start-up Bolder Solve (Svetlana Shasharina as CEO)

Possible Effects on DOE Labs

- Less participation in SBIR from Tech-X (and other established companies)
- Less of “research” in each proposal
 - Commercialization implies extra work (less research tasks and possibly higher overhead)
 - Cross-platform (windows!) installers
 - Documentation and tests
 - Business development
 - Marketing
- Choice of topics governed by possible commercial outcome

Need changes in behavior

- Working with DOE to make changes in SBIR program
 - Reverse restrictions to 10 proposal
 - More logical list of topics aligned with the new vision
 - Add comments to <http://www.regulations.gov/#!submitComment;D=SBA-2013-0008-0001>
- Treat labs like commercial customers (a la DOD with prime contractors)
 - Labs help formulate new topics
 - SBIR companies do work
 - Labs purchase the products and services, upgrades and maintenance
 - Direct subcontracts from the labs

3 SBIR proposals (Oct 15) can be OSG-related

- Adding CAD and facilitating parallel Geant4 runs (John Cary)
- Providing multiresolution capabilities to gridFTP (Alex Pletzer)
- Satellite data served to multiple clients; data needs large storage and significant data processing (David Fillmore)