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SNL ASC Science & Technology Collaborations with Russian Federal Nuclear Centers and Russia Academy of Science Institutes

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Sandia National Laboratories
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ASC PI Meeting, Monterey CA

Sandia National Laboratories

Sandia staff are leveraging Russian colleagues' expertise to advance ASC project objectives

- Engaged in projects with 9 PIs at 5 institutions:
  - RFNCs:
    - *VNIIEF (Sarov – A.A.Selezenev, Y.G.Bartenev, S. Stepanenko, A.P.Orlov);*
    - *VNIITF (Snezhinsk – M.I.Avramenko, I.V.Glazyrin);*
    - *VNIIA (Moscow – V.Sirenko)*
  - RAS Institutes:
    - *JIHT (Moscow – G.E.Norman);*
    - *IPME (St.Petersburg – A. Belyaev)*
- Benefits:
  - Alternative approaches to problems, Access to unique and valuable technology, Technical advances;
  - Insight into state of Russian S&T capabilities.

12 SNL-Russia projects cover topics of Computer Science, Computational Materials, and HEDP (1 of 2)

- Computer Science [N. Pundit w/ ITMF/VNIIEF]:
  - Scalability of parallel algorithms;
  - Interconnect effects on code scalability;
  - Supercomputer efficiency with timing instabilities.
- HEDP & Pulsed Power: [H. Hanshaw]
  - MHD simulation of Z- and Z-Θ pinches (VNIIEF);
  - Simulation of wire array implosions (VNIITF);
  - Hybrid code for PetaWatt laser/dense plasma interaction (VNIITF).

12 SNL-Russia projects cover topics of Computer Science, Computational Materials, and HEDP (2 of 2)

- Computational Materials
  - MD study of phonon generation during cracking (E.P. Chen w/ ITMF/VNIIEF);
  - Platform-independent molecular builder & visualizer (J.Aidun w/ ITMF/VNIIEF);
  - Modeling thermal decomposition of polymeric materials (K. Erickson w/ VNIIA);
  - MD study of phonon generation by laser excitation (E.P.Chen w/ IPME);
  - Performance & reliability of MEMS (E.P.Chen w/ IPME);
  - Extending non-equilibrium MD methods (A.Thompson w/ JIHT);

SNL-Russia Project Highlights

1. G.E.Norman (JIHT) invited to talk at SCCM07: "*Atomistic simulation of plasticity, spall damage and fracture of crystalline and polycrystalline metals under high strain rate.*"
2. VNIIA-Mendeleyev U.-VNIIPO-SNL joint paper: "Thermal Decomposition Mechanism of PMDI-Based Polyurethane Foam Studied by Multiple Methods," submitted to *J. Polymer Degradation and Stability*
3. VNIIEF Comp.Sci. researchers' analytical model successfully predicts operating system noise effects on the scale of parallelism.
4. VNIITF hybrid PIC MHD code reveals importance of kinetic effects in the evolution of thermal instabilities in Z-Pinches.