

Greetings from Serpent Developer Team

4th International Serpent UGM, Cambridge, UK, Sept. 17-19, 2014
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Background

Development of Serpent started at VTT in 2004:

- ▶ Original idea was to develop a simplified Monte Carlo code dedicated to spatial homogenization
- ▶ Calculation routines optimized for reactor physics calculations at the fuel assembly level
- ▶ Built-in burnup calculation capability implemented in 2008

Public distribution of Serpent started in 2009, and the applications started to diversify along with the growing user community

Funding from VTT, Finnish national research programmes and the EU

Serpent development

Developer team at VTT:

- ▶ Jaakko Leppänen (misc. stuff)
- ▶ Maria Pusa (CRAM, deterministic solvers for homogenization)
- ▶ Tuomas Viitanen (TMS temperature treatment routine)
- ▶ Ville Valtavirta (multi-physics coupling)
- ▶ Toni Kaltiaisenaho (photon transport)

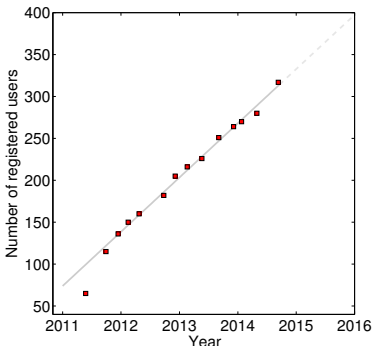
Two focus areas in Serpent development:

- i) Advanced methods for spatial homogenization
- ii) Coupled multi-physics calculations

Serpent user community

User community in numbers:

- ▶ 318 registered users in mailing list (44% Europe, 40% North America)
- ▶ 117 organizations (54% universities)
- ▶ 31 countries
- ▶ 191 users for Serpent 2
- ▶ Typical user: M.Sc. or Ph.D. student
- ▶ 48 Theses on Serpent-related topics since 2007
- ▶ 200 scientific journal and conference papers since 2005



Serpent website: <http://montecarlo.vtt.fi>

Serpent discussion forum: <http://ttuki.vtt.fi/serpent>

Serpent user community

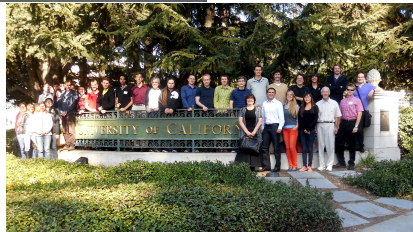
Typical applications:

- ▶ Group constant generation for reactor simulator codes (DYN3D, PARCS, SIMULATE, ARES, TRAB3D, ...)
- ▶ Research reactor modeling
- ▶ Burnup calculations
- ▶ Coupled multi-physics applications (coupling to CFD, thermal hydraulics and fuel performance codes)

New near-term future applications:

- ▶ Radiation shielding (gamma transport)
- ▶ Fusion neutronics (tritium breeding, material damage and activation)

Previous User Group Meetings



Group photos from International Serpent User Group Meetings: Dresden, 2011; Madrid, 2012; Berkeley, 2013.

This meeting

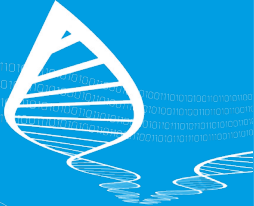
- ▶ 3 days, 26 technical presentations, divided into 5 topics:
 1. Spatial homogenization
 2. Coupled multi-physics calculations
 3. New methods in Serpent 2
 4. Gen-IV applications
 5. Research reactor modeling
- ▶ 30 minutes reserved for presentation, questions and discussion, but the schedule is flexible
- ▶ Presentations collected at a website after the meeting (send pdf to Jaakko.Leppanen@vtt.fi)
- ▶ Group photo tomorrow after lunch, before the technical tour
- ▶ Schedule for Friday afternoon is open, so any suggestions are welcome

Enjoy the 4th International Serpent User Group Meeting!

Jaakko.Leppanen@vtt.fi

<http://montecarlo.vtt.fi>

NOTE: If you are participating PHYSOR 2014, don't forget the workshop "*New features and capabilities in the Serpent 2 Monte Carlo code*" on Sunday morning (8am)



TECHNOLOGY FOR BUSINESS

