

Second Elmer/Ice users meeting 29 April 2014 – Vienna (EGU 2014)

Program

- ✓ General presentation of Elmer/Ice – Olivier Gagliardini (LGGE)

- ✓ Recent important developments – Thomas Zwinger (CSC)

- ✓ Current developments
 - ✓ Adrien Gilbert (LGGE) - Thermomechanics modelling.
 - ✓ Jean Krug (LGGE) – Calving
 - ✓ ?

- ✓ Discussion / Prospective / Strategy for the future developments

Elmer/Ice versus Elmer

Elmer is an open-source, parallel, Finite Element code, mainly developed by the CSC-IT Center for Science Ltd. in Finland.

Elmer/Ice builds on Elmer and includes developments related to **glaciological** problems.

Elmer/Ice includes a variety of dedicated solvers and user functions for glaciological applications.

The main core of the code is Elmer which needs to be installed before compiling the Elmer/Ice package.

Short history of Elmer/Ice

- ✓ EGU2002: OG was looking for a 3D FE code to model the flow of strain-induced anisotropic polar ice – meet TZ
- ✓
- ✓ March 2003: OG visited CSC for few days: AIFlowSolver and FabricSolver partly implemented
- ✓ August 2005 – One year visit of OG at CSC (Anisotropy, cavity, glaciers, ISMIP tests, ...)
- ✓ February 2008 – First Elmer/Ice Course - Grenoble
- ✓ June 2011 – Second Elmer/Ice Course – Finland
- ✓ 2012 – Elmer/Ice has now a website, a logo and a mailing list
- ✓ 2012 – Elmer/Ice comes as a Elmer Package – New wiki
- ✓ 2012 – Elmer/Ice course at UBC/SFU
- ✓ 2013 – Elmer/Ice courses at Univ. Washington and Univ. Alberta
- ✓ 9 April 2013 – First Elmer/Ice users meeting
- ✓ October 2013 – 2-day beginner Elmer/Ice course at LGGE
- ✓ November 2013 – 3-day advanced workshop at CSC
- ✓ 29 April 2014 – Second Elmer/Ice Users meeting ... here we are

Elmer/Ice website

<http://elmerice.elmerfem.org/>

elmer ICE NEWS PUBLICATIONS CAPABILITIES USERS COMMUNITY COURSES TUTORIALS MATERIALS DOCUMENTATIONS LOG IN

Q search...

Welcome

Elmer is an open-source, parallel, Finite Element code, mainly developed by the [CSC-IT Center for Science Ltd.](#) in Finland. Elmerice builds on Elmer and includes developments related to glaciological problems.

Elmerice includes a variety of dedicated solvers and user functions which are described in these pages.

The aim of this website is to present in detail the Elmerice capabilities and to distribute course materials and tutorials.

Elmerice is mainly developed by CSC (Espoo, Finland), the Laboratory of Glaciology and Environmental Geophysics LGGE (Grenoble, France) and the Institute of Low Temperature Science ILTS (Sapporo, Japan), but others contributors are welcome!

Elmer/Ice at EGU 2013

Written by [Oliver Jaglandini](#).

Don't miss the first **Elmerice users meeting** to be held during the EGU 2013, Tuesday 9th April 12:15-15:00, Room Y3. More information regarding this meeting can be found [here](#).

Here is a list of the known Elmerice talks and posters that will be presented at the forthcoming EGU in Vienna, 8-12 April 2013. Please, if your talk/poster is not listed, contact me (OG) and I will add your presentation.

Tuesday, April 09, 2013

12:15-15:00 Elmerice users meeting, Room Y3.

15:30-17:00 / Room G3 - CR1.3 - Subglacial Environments of Ice Sheets and Glaciers

- 16:45-17:00: [EGU2013-12218](#) Importance of basal processes in simulations of a surging Svalbard outlet glacier. Rupert Gladstone, Martina Schäfer, Thomas Zwinger, Tazio Strazzi, Yongmei Gong, John Moore, and Thorben Durse.

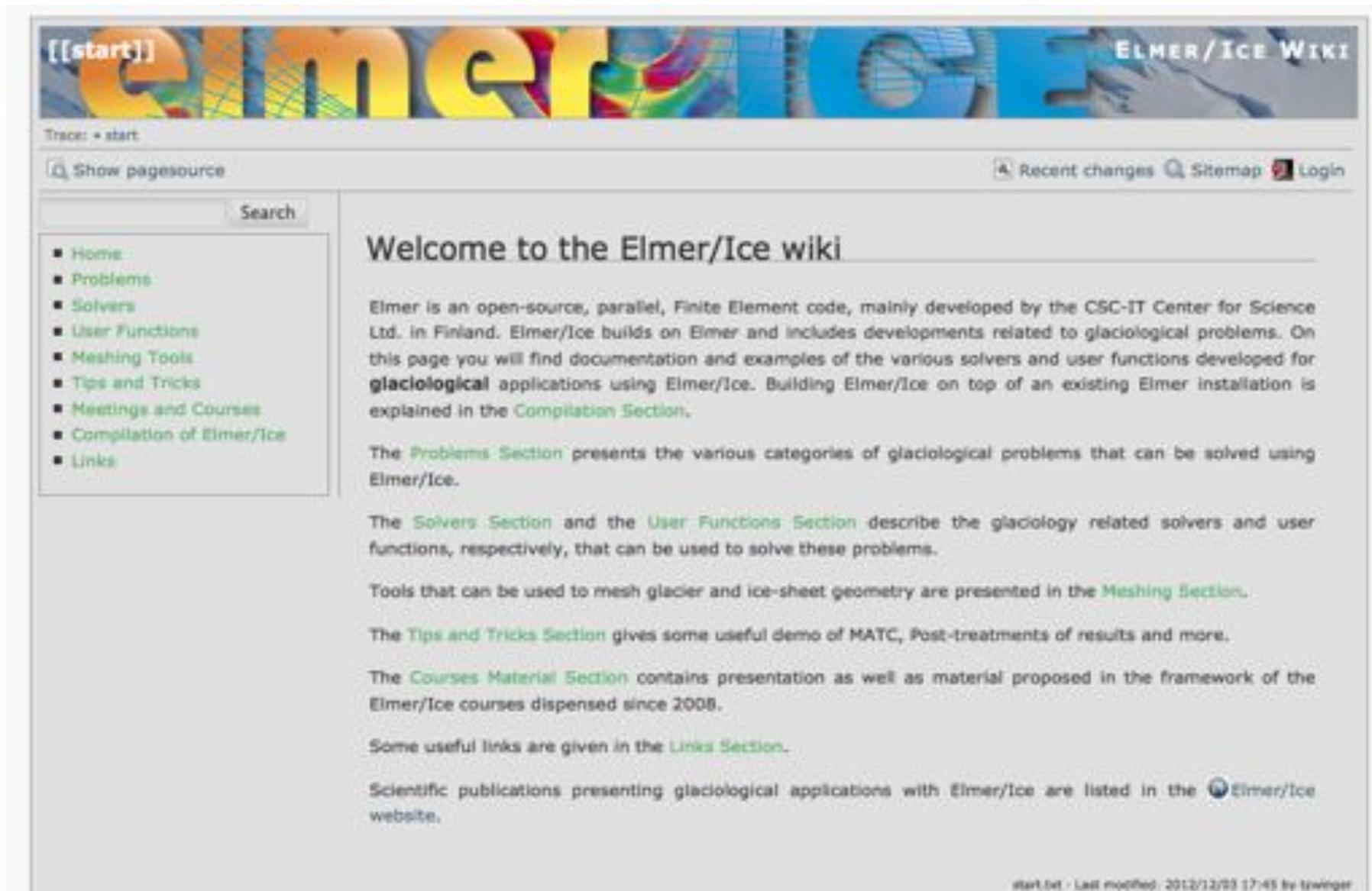
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Elmer/Ice website Audience



Elmer/Ice wiki <http://elmerice.elmerfem.org/wiki/doku.php>



The screenshot shows the Elmer/Ice wiki homepage. At the top, there is a banner with the text "[[start]]" on the left, the "Elmer/Ice" logo in large, colorful, stylized letters in the center, and "ELMER/ICE WIKI" on the right. Below the banner, there is a navigation bar with "Trace: + start" on the left, and "Show pagesource", "Recent changes", "Sitemap", and "Login" on the right. A search box is located below the navigation bar. On the left side, there is a sidebar with a "Search" box and a list of navigation links: Home, Problems, Solvers, User Functions, Meshing Tools, Tips and Tricks, Meetings and Courses, Compilation of Elmer/Ice, and Links. The main content area features a heading "Welcome to the Elmer/Ice wiki" followed by several paragraphs of text. The first paragraph introduces Elmer as an open-source, parallel, Finite Element code developed by the CSC-IT Center for Science Ltd. in Finland, and mentions that Elmer/Ice builds on Elmer and includes developments related to glaciological problems. It states that the page contains documentation and examples of solvers and user functions for glaciological applications, and that building Elmer/Ice on top of an existing Elmer installation is explained in the "Compilation Section". The second paragraph describes the "Problems Section" as presenting various categories of glaciological problems that can be solved using Elmer/Ice. The third paragraph describes the "Solvers Section" and the "User Functions Section" as describing glaciology-related solvers and user functions. The fourth paragraph mentions that tools for meshing glacier and ice-sheet geometry are presented in the "Meshing Section". The fifth paragraph states that the "Tips and Tricks Section" gives some useful demo of MATC, Post-treatments of results and more. The sixth paragraph mentions that the "Courses Material Section" contains presentation as well as material proposed in the framework of the Elmer/Ice courses dispensed since 2008. The seventh paragraph states that some useful links are given in the "Links Section". The eighth paragraph mentions that scientific publications presenting glaciological applications with Elmer/Ice are listed in the "Elmer/Ice website". At the bottom right of the page, there is a small text: "start.txt - Last modified: 2012/12/03 17:45 by tzwingar".

Important links

Elmer at CSC (documentation, how to install, ...)

<http://www.elmerfem.org/>

<http://www.csc.fi/english/pages/elmer>

Elmer Forum

<http://elmerfem.org/forum/>

Elmer/Ice webpage

<http://elmerice.elmerfem.org/>

Elmer/Ice wiki

<http://elmerice.elmerfem.org/wiki/doku.php?>

Elmer/Ice mailing list

To subscribe to the Elmer/Ice list *elmerice@elmerfem.org*, just sent an email to *majordomo@elmerfem.org*, with in the body the text:

subscribe elmerice

If you do not know how to use mailing lists run by majordomo you may sent a mail with "help" in the message body.

What's new this year?

Elmer/Ice Package - Solvers

New Solvers

AdjointSolver.f90

Optimize_m1qn3Parallel.f90

CostSolver_Adjoint.f90

CostSolver_Robin.f90

DJDBeta_Adjoint.f90

DJDBeta_Robin.f90

DJDmu_Adjoint.f90

DJDmu_Robin.f90

m1qn3.f

IDSSolver.f90

EPLSolver.f90

OutputStrainHeating.f90

ThicknessSolver.f90

UpdateExport.f90

pointwise.f90

Grid2DInterpolator.f90

New User Functions

USF_GetFrictionHeating.f90

USF_WaterTransfer.f90

Elmer/Ice Package

* A suit of tests have been included in the Elmer/Ice distribution to validate new developments and new installation.

You are more than welcome to contribute and add new tests.

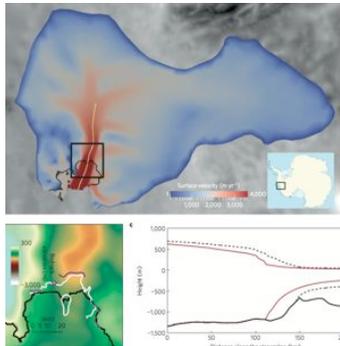
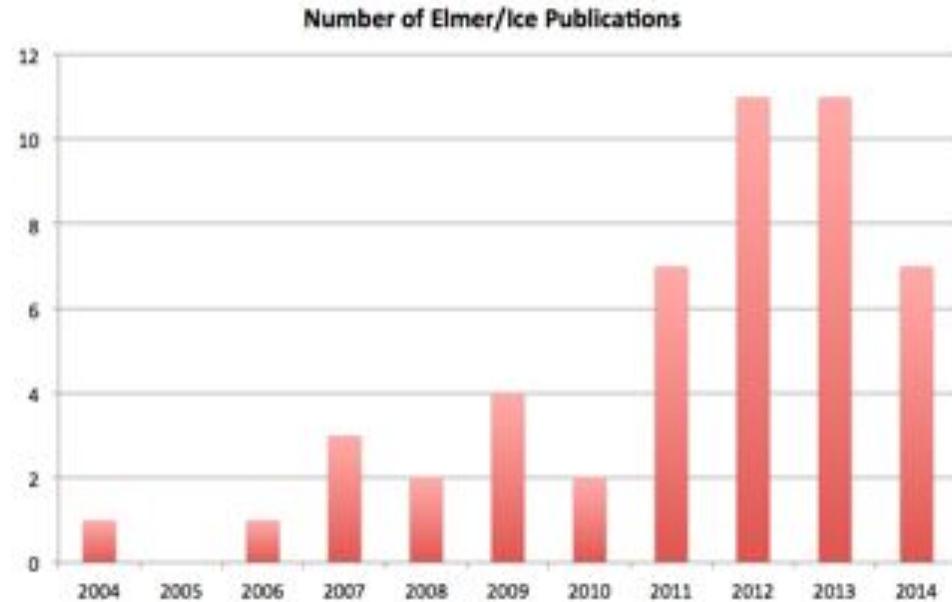
See the *Tests of Elmer/Ice* wiki page

* Twitter Elmer/Ice account



Elmer/Ice applications

Around 50 publications using Elmer/Ice since 200



PIG paper by Favier et al., Nature Climate Change, 2014

9 cited references including results from Elmer/Ice in the 5th IPCC report



Current or planned developments

- **Calving law (damage mechanics)**
- **Hydrology model to infer basal water pressure**
- **Moving margins / remeshing / adaptive mesh**
- Coupling with an ocean model / Implementation of a plume model
- Accounting for refreezing in the temperature equations
- Inversion of bedrock topography
- Lower order Stokes models (SSA, SSA*,...)