Contribution ID: **362** Type: **Poster**

EUROfusion Integrated Modelling (EU-IM) capabilities and selected physics applications

Tuesday, October 18, 2016 2:00 PM (4h 45m)

Recent developments and achievements of the EUROfusion Code Development for Integrated Modelling project (WPCD, follow-up of EFDA-ITM-TF), which aims at providing a validated integrated modelling suite for the simulation and prediction of complete plasma discharges in any tokamak, are presented. WPCD develops generic complex integrated simulations, workflows, for physics applications, using the standardized EU Integrated Modelling (EU-IM) framework. The integration of codes in EU-IM workflows is besides accompanied by a thorough cross-verification and, recently, by the introduction of rigorous release procedures. Among the achievements, the European Transport Simulator (ETS), has now reached a capability equivalent to the state-of-the-art integrated modeling transport codes, including interchangeable physics modules for equilibrium (both fixed and free boundary), transport (interpretative analytical, neoclassical, anomalous), impurities (all ionization states), NTM, sawteeth, pellets, neutrals, Heating and Current Drive (HCD) sources including all the heating schemes (EC, NBI, IC, nuclear) and synergy effects. The core ETS has been released and deployed at JET, offering a leading tool for both interpretive transport analysis and predictive modelling of complex scenarios. Selected physics applications are presented, in particular ETS simulations of plasma density control in reactor-scale plasmas fueled with multiple pellets.
A MHD stability chain was developed for the analysis of equilibria from any tokamak in the EU-IM platform; it includes a pool of interoperable high-resolution equilibrium and linear MHD stability codes. Having passed a benchmark on core and global ideal kink instabilities, the chain has been released and applied to the predictive analysis of DEMO and JT60-SA scenarios and can be straightforwardly used for interpretive runs on present devices as JET and ASDEX Upgrade.
A predictive J-alpha MHD pedestal stability analysis workflow has also been developed. Routine application to sensitivity analysis of DEMO1 scenarios is performed.
Furthermore, a workflow including a turbulence code and a synthetic probe was developed and applied to investigate the turbulent transport in the edge and Scrape-Off-Layer (SOL) of ASDEX Upgrade. Finally, a prototype edge workflow integrating the interaction with PFC was demonstrated.

Paper Number

TH/P2-13

Country or International Organization

France

Primary author: Dr FALCHETTO, Gloria (CEA)

Co-authors: Dr NIELSEN, Anders Henry (PPFE, Department of Physics, Technical University of Denmark, Kgs. Lyngby, Denmark); Ms ALBERTO MORILLAS, Angelines (CIEMAT); Ms ŠUŠNJARA,, Anna (FESB); Dr MERLE, Antoine (EPFL SPC); Dr FIGUEIREDO, Antonio (IPFN IST); Mr PALAK, Bartek (PSNC); Dr FAUGERAS, Blaise (LABORATOIRE J.A.DIEUDONNE, UNIVERSITE DE NICE-SOPHIA-ANTIPOLIS, FR); Prof. SCOTT, Bruce D. (MPG IPP); Dr VIOLA, Bruno (ENEA Frascati); Dr ATANASIU, Calin Vlad (INFLPR); Dr LECHTE, Carsten (INSTITUTE OF INTERFACIAL PROCESS ENGINEERING AND PLASMA TECHNOLOGY, UNIVERSITY OF STUTTGART); Dr BOULBE, Cedric (LABORATOIRE J.A.DIEUDONNE, UNIVERSITE DE NICE-SOPHIA-ANTIPOLIS, NICE FRANCE); Mr FUCHS, Christoph (MPG IPP); Dr GLEASON-GONZALEZ, Cristian (KIT); Mr TEGNERED, Daniel (DEPARTMENT OF EARTH AND SPACE SCIENCES, CHALMERS UNIVERSITY OF TECHNOLOGY); Dr COSTER, David (MPG IPP Garching, Germany); Prof. TSKHAKAYA, David (Fusion@ÖAW, Institute of Applied Physics, TU Wien); Dr SAMADDAR, Debasmita (CCFE); Dr KALUPIN, Denis (EUROfusion PMU, Garching); Dr YADIKIN, Dimitri (DEPARTMENT OF EARTH AND SPACE SCIENCES, CHALMERS UNIVERSITY OF TECHNOLOGY); Dr REISER, Dirk (FZJ); Dr VAN EESTER, Dirk (LPP-ERM/KMS); Dr BORODIN, Dmitiriy (Forschungszentrum Jülich GmbH, Institut für Energie- und Klimaforschung IEK-4: Plasmaphysik); Prof. POLJAK, Dragan (FESB); Dr GIOVANNOZZI, Edmondo (ENEA Frascati); Dr WESTERHOF, Egbert (FOM INSTITUTE DIFFER); Dr SUCHKOV, Egor (DEPARTMENT OF EXPERIMENTAL PHYSICS, FACULTY OF MATHEMATICS, PHYSICS AND INFORMATICS COMENIUS UNIVERSITY BRATISLAVA); Dr POLI, Emanuele (Max-Planck-Institute for Plasma Physics); Dr FABLE, Emiliano (MPG IPP); Dr NARDON, Eric (CEA); Dr ANDERSSON SUNDÉN, Erik (DEPARTMENT OF PHYSICS AND ASTRONOMY, UPPSALA UNIVERSITY,SWEDEN); Dr LERCHE, Ernesto Augusto (LPP-ERM/KMS); Dr VILLONE, Fabio (CONSORZIO CREATE, UNIVERSITÀ DI CASSINO E DEL LAZIO MERIDIONALE); Prof. ZAITSEV, Feodor (DEPARTMENT OF EXPERIMENTAL PHYSICS, FACULTY OF MATHEMATICS, PHYSICS AND INFORMATICS COMENIUS UNIVERSITY BRATISLAVA); Dr CASSON, Francis (CCFE); Dr IMBEAUX, Frédéric (CEA-IRFM); Dr CIRAOLO, GUIDO (CEA, IRFM); Dr SZEPESI, Gabor (CCFE); Dr MANDUCHI, Gabriele (CONSORZIO RFX, PADOVA); Prof. POKOL, Gergo I. (INSTITUTE OF NUCLEAR TECHNIQUES, BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS, BUDAPEST); Dr FOGACCIA, Giuliana (ENEA Frascati); Dr VLAD, Gregorio (ENEA, Dipartimento FSN, C. R. Frascati); Mr PELKA, Grzegorz (IPPLM); Dr RADHAKRISHNAN, Hari (UNIVERSITY OF CYPRUS - DEPT. OF MECHANICAL AND MANUFACTURING ENGINEERING NICOSIA); Dr REIMERDES, Holger (EPFL SPC); Mrs IVANOVA-STANIK, Irena (Institute of Plasma Physics and Laser Microfusion); Mrs SIGNORET, Jacqueline (CEA IRFM); Dr URBAN, Jakub (INSTITUTE OF PLASMA PHYSICS CAS, PRAGUE, CZ); Dr BUCHANAN, James (CCFE); Mr KREK, Janez (LECAD UNIVERSITY OF LJUBLJANA); Dr ARTAUD, Jean-François (CEA IRFM); Ms MADSEN, Jens (PPFE, Department of Physics, DTU); Dr CITRIN, Jonathan (FOM INSTITUTE DIFFER); Mr FERREIRA, Jorge (IPFN IST); Prof. TŐKÉSI, Karoly (INSTITUTE FOR NUCLEAR RESEARCH, HUNGARIAN ACADEMY OF SCIENCES); Dr SCHMID, Klaus (Max-Planck-Institut für Plasmaphysik); Ms GHOOS, Kristel (KU Leuven); Prof. VILLARD, Laurent (EPFL SPC); Dr TOPHØJ, Laust (PPFE, Department of Physics, DTU); Dr KOS, Leon (LECAD UNIVERSITY OF LJUBLJANA); Dr FIGINI, Lorenzo (IFP-CNR Milano IT); Dr BLOMMAERT, Maarten (KU Leuven); Mr PLOCIENNIK, Marcin (PSNC); Dr AIRILA, Markus I (VTT TECHNICAL RESEARCH CENTRE OF FINLAND); Dr O'MULLANE, Martin (DEPARTMENT OF PHYSICS AND APPLIED PHYSICS, UNIVERSITY OF STRATHCLYDE, UK); Prof. BAELMANS, Martine (KU LEUVEN, DEPARTMENT OF MECHANICAL ENGINEERING, BELGIUM); Dr MANTSINEN, Mervi (ICREA-BSC, CIEMAT); Mr OWSIAK, Michal (PSNC); Mr HORSTEN, Niels (KU Leuven); Dr MARUSHCHENKO, Nikolai (MPG GREIFSWALD); Mr HOENEN, Olivier (MPG IPP); Dr SAUTER, Olivier (EPFL SPC); Dr MAJ, Omar (MPG IPP); Dr ASUNTA, Otto (AALTO); Mr VALLEJOS, Pablo (FUSION PLASMA PHYSICS, EES, KTH); Dr STRAND, Par (Chalmers University of Technology); Prof. MC CARTHY, Patrick J. (UNIVERSITY COLLEGE CORK (UCC) , IRELAND); Dr RODRIGUES, Paulo (IPFN IST); Mr HUYNH, Philippe (CEA IRFM); Dr MAYO-GARCIA, Rafael (CIEMAT); Dr DUMONT, Remi (CEA IRFM); Dr BILATO, Roberto (MPG IPP); Dr LOHNER, Roland (INSTITUTE OF NUCLEAR TECHNIQUES, BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS, BUDAPEST); Dr STANKIEWICZ, Roman (IPPLM); Dr ZAGORSKI, Roman (Institute of Plasma Physics and Laser Microfusion); Dr COELHO, Rui (IPFN, IST, Lisboa, Portugal); Dr MORADI, Sara (ULB); Dr CONROY, Sean (DEPARTMENT OF PHYSICS AND ASTRONOMY, UPPSALA UNIVERSITY); Dr SIPILÄ, Seppo K (AALTO); Dr BRIGUGLIO, Sergio (ENEA Frascati); Dr NOWAK, Silvana (Istituto di Fisica del Plasma, IFP-CNR); Dr ŠESNIĆ, Silvestar (FESB); Dr ÄKÄSLOMPOLO, Simppa (AALTO UNIVERSITY); Mr MASTROSTEFANO, Stefano (CONSORZIO CREATE, UNIVERSITÀ DI CASSINO); Dr VAROUTIS, Stylianos (Karlsruhe Institute of Technology (KIT)); Mr ANIEL, Thierry (CEA IRFM); Dr JOHNSON, Thomas (FUSION PLASMA PHYSICS, EES, KTH, STOCKHOLM); Mr ZOK, Tomasz (PSNC); Dr PAIS, Vasile (INFLPR); Dr DORIÆ, Vicko (FESB); Dr GOLOBOROD'KO, Viktor (UNIVERSITY OF INNSBRUCK, ÖAW); Dr BASIUK, Vincent (CEA IRFM); Dr PERICOLI-RIDOLFINI, Vincenzo (ENEA Frascati); Dr KOTOV, Vladislav (FZJ); Dr NATORF, Wlodzimierz (IPPLM); Dr ZWINGMANN, Wolfgang (IPFN IST); Mr SAEZ, Xavier (BSC); Dr MARANDET, Yannick (PIIM, CNRS/Aix-Marseille Univ., Marseille, France, EU)

Presenter: Dr FALCHETTO, Gloria (CEA)

Session Classification: Poster 2

Track Classification: THC - Magnetic Confinement Theory and Modelling: Confinement