Andrea Trucchia | Resume

Personal Information

Experience

Current

CIMA International Center for Environmental Monitoring　　　　　**Savona, Liguria, Italy**
Permanent Researcher　　　　　*19 September 2019, present*
Currently I am a Permanent Researcher at CIMA, under the supervision of Dr Paolo Fiorucci. My current research topic is computational wild-land fire (through fire spread simulators) and statistical / machine learning based analysis of wild-fire occurrences. I have been appointed (Academic Years 2019-2020, 2020-2021, 2021-2022) Teaching Assistant for the course *Wildfire Risk Assesment and Management* in the framework of the University of Genoa Master's Degree in *Engineering for Natural Risk Management* where I taught Machine-Learning techniques for wildfire risk mapping.

Past

BCAM-Basque Center for Applied Mathematics and UPV-EHU　　　**Bilbao, Basque Country, Spain**
Researcher, PhD Student - Graduation Month: 10/2019　　　*19 October 2015, 15 September 2019*
I have been a PhD student at BCAM, under the supervision of Dr Gianni Pagnini. The research topic was front propagation in random media (combustion, anomalous diffusive media, etc.). I used level set methods and other numerical recipes for front tracking issues in random environment. Main applications of the developed models are Turbulent Combustion, Wild-land fire simulation, Biofilm spread. Uncertainty Quantification and Sensitivity Analysis routines were essential tools for my research.

CERFACS　　　　　**Toulouse, France**
Researcher in Uncertainty Quantification　　　　　*September 2017 - March 2018*
I did a research stay of 6 months at CERFACS research center located in Meteo France Research Center, Toulouse, France. I developed statistical code in C and Python in order to study the fire spotting phenomenon in wild-land fires.

Politecnico di Torino　　　　　**Turin, Italy**
Researcher　　　　　*February - October 2015*
I had been involved in a project funded, among the other institutions, by ESA, "Numerical simulation of thermal plasmas and their interaction with Electro-magnetic fields for aerospace apllications". The main aim of this work was the maintainance and speed-up of a Fortran-based finite volume code that simulate the ionized high-temperature flow around a space ship during atmospherical re-entry, in order to cooperate with Telecom. Engineers that would use the furnished data to develop the best antenna to be placed in the simulated spaceship.

Politecnico di Torino **Turin, Italy**

Teaching Assistant *2012 - 2014*

I have been appointed Teaching Assistant (as a senior MSc Student) for the courses: Geometry, Rational Mechanics, Introductory Maths. The principal aim of that activity has been to convey complex ideas in simple terms. I have also guided extra-lessons in order to provide the Rational Mechanics students a full preparation for the exams.

Education

PhD degree

UPV-EHU **Leioa Campus, Spain**

Mathematics and Statistics, Cum Laude *2015-2019*

Title: *Front Propagation in Random Media*

Thesis Director: Dr. Gianni Pagnini

This PhD thesis dealt with the problem of the propagation of fronts under random circumstances. A statistical model to represent the motion of fronts when are evolving in a media characterized by microscopical randomness is discussed and expanded, in order to cope with three distinct applications: wild-land fire simulation, turbulent premixed combustion, biofilm modeling.

Master's Degree

Politecnico di Torino **Italy**

MSc, Mathematical Engineering, GPA: 28.25/30 Final degree: 110/110 *2012-2014*

Description: this degree focused on gaining a knowledge on the fields of Applied Maths and Mechanical-Civil Engineering simulations. Main subjects: Wind Engineering (30/30) , Comp. Fluid Dynamics (30/30), Numerical Methods for Partial Diff. Equations (28/30), Theoretical Fluid Dynamics (30/30 w. honors), Fluid Mechanics (30/30 w. honors), Models in Biomechanics and Biomedicine (30/30 w. honors), Stochastic Processes (30/30 w. honors).

Master's degree thesis

Title: *A survey on Plasma Physics and numerical approximation of ideal MHD equations*

Advisor: Prof. Domenic D'Ambrosio

Thesis Description: : This thesis explored the physical principles of plasma physics in order to formally derive the MagnetoHydroDynamic (MHD) equations. After some simplification, a Finite-Volume solver written in Fortran language is described and implemented.

Bachelor's Degree

Universitá degli studi di Camerino **Italy**

BSc, Applied Mathematics, GPA: 28.66/30 Final Degree: 110/110 with honors *2008-2011*

This degree focused heavily on gaining a wide knowledge of theoretical and applied maths. Main subjects: Mathematical Analysis, Geometry, Numerical Analysis, Optimization, Statistics, C/C++ programming.

Languages

Italian: Mothertongue

English: Advanced *Technically and conversationally fluent;*

Spanish: Advanced *Technically and conversationally fluent;*

Euskera: Basic *Basic/Average user.*

French: Basic *Basic level of proficiency*

Language Certificates

English I.E.L.T.S : Listening 8.5; Speaking: 7.0; Reading: 9.0; Writing: 6.5; Total grade: 8.0

English P.E.T: Pass with merit

Euskera HABE: B1 Certificate

Computer skills

Basic: C++, FreeFem

Intermediate: C, R, LaTeX, Linux, Microsoft Windows, MPI packages, Matlab, Octave, Petsc, WRF-Sfire, Qgis, NetCDF and HFD5 data management

Advanced: Fortran, Python (scikit-learn, Matplotlib, pandas, geopandas, openturns, scipy...)

Projects

Selected Research Projects

January 2022 - ongoing: PPRD EAST III , EU-funded programme "Prevention, Preparedness and Response to natural and man-made disasters in Eastern Partnership countries". Expert for definition of Table Top Exercises and scenarios, implementation of static risk and hazard maps, simulators and early warning systems for wildfire management. Target countries: Ukraine, Moldova, Azerbaijan, Armenia, Georgia. The current hazard mapping in Ukraine has switched in March 2022 from prevention to active action providing Early Warning Systems to displaced population.

2021- ongoing: IPA Floods and Fires, EU funded project. Target countries: Western Balkans and Turkey. Trainings, table-top and field exercises (scenario analysis...), exchange of experts, procurement of ground forest firefighting equipment and awareness raising campaigns

October 2020- September 2021: UN Office for Disaster Risk Reduction project "Disaster Risk Reduction Capacity Building in Ethiopia:Developement of an Information Management System for Early Warning for Forest Fires in Ethiopia. Project Manager and researcher.

November 2020 - May 2021: World Bank Project "WILDFIRE RISK ASSESSMENT FOR THE BULGARIAN NATIONAL DISASTER RISK PROFILE" (Reference: P170629)

2020-ongoing: ARISTOTLE-ENHSP (European Natural Hazard Scientific Partnership). Wildfire Hazard Leader duties for ARISTOTLE 2 and ARISTOTLE3 projects.

01/01/2017, 31/12/2019 : MINECO Project MTM2016-76016-R *Novel Method for Modelling Interface Propagation with Environmental and Engineering Applications*

Awards and fundings

2019, BYMAT BBVA grant: travel and accomodation grant in order to attend the Second BYMAT conference in Madrid

2018, BYMAT BBVA grant: travel grant in order to attend first BYMAT conference in Madrid

2015, Caixa Grant : funding to support PhD studies

2015, *Prof. Muggia Prize*: Special mention for MSc Thesis work

2008- 2011, E.R.S.U. Grant: grant to support BSc studies

Co-Tutored MSc. Thesis

Student: Hamed Izadgoshasb,: *Machine Learning techniques for wildfire management* (2022)

Student: Gondoletta C.,: *Early Warning Systems for Wildfire Hazard in Italy: a Sensor Network-Based Approach.* (2021)

Student: Isnardi S.: *A Machine learning models comparison for wildfire susceptibility maps at the regional scale: the case of Liguria region, Italy.* (2021)

Selection of Given Courses

Online course, March 2021: Online training on myDEWETRA platform and forest fire information management system for Ethiopia, for the UN Office for Disaster Risk Reduction project "Disaster Risk Reduction Capacity Building in Ethiopia:Developement of an Information Management System for Early Warning for Forest Fires in Ethiopia

University of Camerino, Italy, School of Science and Technology, 18-19 December 2019: Teacher for the short course "Sensitivity Analysis and Uncertainty, Quantification in Mathematical Models"

Selection of Attended courses

Instituto de Altos Estudios Espaciales "Mario Gulich": Online Course "Gestión de incendios forestales mediante el uso de la plataforma Google Earth Engine" February 08 - 5 March 2021

BCAM, Basque Center for Applied Mathematics, September 17-21 2018: Data and Decisions

CERFACS, Toulouse, France November 16 -17 2017: Modeles de Programmation parallele MPI, OpenMP

CINECA, Rome, Italy July 10 -21 2017: 26th Summer School on Parallel Computing

CERFACS, Toulouse, France June 06-09 2017: Course on Data Assimilation

BCAM, Basque Center for Applied Mathematics May 15 -17 2017: Introduction to data assimilation

BCAM, Basque Center for Applied Mathematics May 24 -28 2017: Introduction to statistical modeling in R

CINECA, Rome, Italy 29/08 - 02/09 2016: 124th European Study Group with Industry

BCAM, Basque Center for Applied Mathematics May 16 -18 2016: Introduction to parallel programming

BCAM, Basque Center for Applied Mathematics, April 07 2016: Classroom Training Course: Scopus Advanced Level

BCAM, Basque Center for Applied Mathematics, April 03-07 2016: Workshop on hydrodynamics of wave energy converters

Research Papers

Selection of Published papers

○ **Trucchia, A.**; Meschi, G.; Fiorucci, P.; Provenzale, A.; Tonini, M; Pernice, U. *Wildfire hazard mapping in the Eastern Mediterranean landscape. International Journal of Wildland Fire*, 2023, in press

○ **Trucchia, A.**; Izadgoshabsb, H; Isnardi, S.; Fiorucci, P.; Tonini, M. *Machine-Learning Applications in Geosciences: Comparison of Different Algorithms and Vegetation Classes' Importance Ranking in Wildfire Susceptibility. Geosciences*, 2022, 12 (11), 424

○ **Trucchia, A.**;Meschi, G.; Fiorucci, P.; Gollini, A.; Negro, D. *Defining Wildfire Susceptibility Maps*

in Italy for Understanding Seasonal Wildfire Regimes at the National Level. Fire, 2022, 5, 30. https://doi.org/10.3390/fire5010030

○ Egorova, V.N., **Andrea Trucchia**, Pagnini, G. *Fire-spotting generated fires. Part II: The role of flame geometry and slope. Applied Mathematical Modelling*, 2022, 104. pp 1-20 , ISSN 0307-904X, https://doi.org/10.1016/j.apm.2021.11.010.

○ **Trucchia, A.**; Frunzo, L. *Surrogate based Global Sensitivity Analysis of ADM1-based Anaerobic Digestion Model . Journal of Environmental Management*, 2021, 282.

○ **Trucchia, A.**; D'Andrea, M.; Baghino, F.; Fiorucci, P.; Ferraris, L.; Negro, D.; Gollini, A.; Severino, M. *PROPAGATOR: An Operational Cellular-Automata Based Wildfire Simulator. Fire*, 2020, 3, 26.

○ Marj Tonini, Mirko D'Andrea, Guido Biondi, Silvia Degli Esposti, **Andrea Trucchia** and Paolo Fiorucci, *A machine learning based approach for wildfire susceptibility mapping. The case study of Liguria region in Italy., Geosciences* 2020, 10, 105.

○ **A. Trucchia**, V.Egorova, A. Butenko, I. Kaur, G. Pagnin, *RandomFront 2.3 A physical parametrisation of fire-spotting for operational fire spread models: Implementation in WRF-Sfire and response analysis with LSFire+ Geoscientific Model Development 12 (1) 2019*, `https://www.geosci-model-dev-discuss.net/gmd-2018-33/`

○ **A. Trucchia**,V. Egorova, G. Pagnini, M.C. Rochoux, *On the merits of sparse surrogates for global sensitivity analysis of multi-scale nonlinear problems: application to turbulence and fire-spotting model in wildland fire simulators*, (2019), *Communications in Nonlinear Sciences and Numerical Simulation*, Volume 73, 15 July 2019, pages 120-145, doi = `https://doi.org/10.1016/j.cnsns.2019.02.002,`

○ V.N. Egorova, **A. Trucchia**, G. Pagnini, *Fire-spotting generated fires.Part I: The role of atmospheric stability* (2019), *Applied Mathematical Modelling*. doi = `https://doi.org/10.1016/j.apm.2019.02.010`

○ **A. Trucchia**, M.R. Mattei, V. Luongo, L. Frunzo, M.C. Rochoux, *Surrogate-based Uncertainty and Sensitivity Analysis for Bacterial Invasion in Multi-species Biofilm Modeling*, *Communications in Nonlinear Sciences and Numerical Simulation*, Volume 73, 15 July 2019, Pages 403-424, doi = `https://doi.org/10.1016/j.cnsns.2019.02.024`

○ **A. Trucchia** and Gianni Pagnini. *Restoring property of the Michelson-Sivashinsky equation. Combustion Science and Technology* 191 (9), (2019), doi = `10.1080/00102202.2019.1632839`

Proceedings

○ Crespo-Santiago, A.; **Trucchia, A.;** Fiorucci, P.; Pagnini, G. Probability Density Function of a Random Area and Its Application to Wildfires. Environ. Sci. Proc. 2022, 17, 75. https://doi.org/10.3390/environsciproc2022017075

○ Meschi, G.; **Trucchia, A.;** Biondi, G.; Fiorucci, P. Using Crossborder Multisource Burned Area Datasets for Assessing Wildfire Susceptibility Using Machine Learning Techniques. Environ. Sci. Proc. 2022, 17, 33. https://doi.org/10.3390/environsciproc2022017033

○ Perello, N.; **Trucchia, A.;** D'Andrea, M.; Esposti, S.D.; Fiorucci, P. RISICO, An Enhanced Forest Fire Danger Rating System: Validation on 2021 Extreme Wildfire Season in Southern Italy. Environ. Sci. Proc. 2022, 17, 37. https://doi.org/10.3390/environsciproc2022017037

○ López-De-Castro, M.; **Trucchia, A.;** Fiorucci, P.; Pagnini, G. Physical and Non-Physical Fire-Spotting Models: A Comparison Study by a Wildfire Simulator Based on a Cellular Automata Approach. Environ. Sci. Proc. 2022, 17, 27. https://doi.org/10.3390/environsciproc2022017027

○ D'Andrea, M.; **Trucchia, A.;** Biondi, G.; Degli Esposti, S.; Fiorucci, P. Sharing Information for Wildfire Risk Management: The MEDSTAR Platform. Environ. Sci. Proc. 2022, 17, 25.

https://doi.org/10.3390/environsciproc2022017025

○ López-De-Castro, M; **Trucchia, A;**, Fiorucci P.; Pagnini G. A comparison study between fire-spotting models by a wildfire simulator based on a cellular automata approach - EGU General Assembly Conference Abstracts, 2022

○ **Trucchia, A;** Meschi, G.; Tonini, M; Fiorucci P.; Computing wildfire Susceptibility Maps at the national level in Italy: a Machine Learning approach - EGU General Assembly Conference Abstracts, 2022

○ **A. Trucchia**, P. Fiorucci, M. Massabò, A. Zegeye, K. M. Soltesova, N. Yasin, C. Debele, A. Abebe. *A multi-agency Forest Fire Early Warning System for environment and biodiversity preservation in Ethiopia*, accepted for XV World Forestry Congress, 2022, Seoul, Republic of Korea

○ M.C. Rochoux, A. Costes, R Paugam, G. Rea, L. Thouron, **A. Trucchia**, C. Zhang, T. Jaravel, C. Lac, V. Masson, A. Trouvé, O. Vermorel, D. Lucor. *Emulating environmental modeling systems in presence of uncertainties: overview and challenges.* Workshop on Frontiers of Uncertainty Quantification in Fluid Dynamics 11–13 September 2019, Pisa, Italy

○ G. Pagnini, **A. Trucchia**, *Quasi-probability Approach for Modelling Local Extinction and Counter-gradient in Turbulent Premixed Combustion* . Proceedings Joint Meeting the German and Italian Sections of the Combustion Institute, 23-26/05/2018, Sorrento, Italy

○ **A. Trucchia**, G. Pagnini, *The role of the environment in front propagation*, Proceedings of the 18th International Conference on Computational and Mathematical Methods in Science and Engineering, CMMSE 2018 July 9–14, 2018, 2018-07-09

○ Egorova V. N., **Trucchia A.** , Pagnini G.; *Concurent multi-scale physical parametrization of fire-spotting: A study on the role of macro- and meso-scale characteristics of the system* , Advances in Forest Fire Research, 2018

○ Pagnini G.; Egorova V.; **Trucchia A.**; Mentrelli A.; Kaur I. , *Wildfire Propagation Modelling*, Geophysical Research Abstracts Vol. 20, 2018

○ Egorova V. N.; Pagnini G.; **Trucchia A.** *Wildland fire propagation modeling: fire-spotting parametrisation and energy balance.* Proceedings of the 17th International Conference on Computational and Mathematical Methods in Science and Engineering, CMMSE 2017, pp. 805 - 813, 2017-07-04

○ Egorova V. N.; Pagnini G.; **Trucchia A.** *Wildland fire propagation modelling.* MODELLING FOR ENGINEERING AND HUMAN BEHAVIOUR 2017 Extended abstract, December 2017

○ Pagnini G.; **Trucchia A.** *Darrieus-Landau instabilities in the framework of the G-equation.* Digital proceedings of the 8th European Combustion Meeting, 18-21 April 2017, Dubrovnik, Croatia, April 2017

○ Pagnini G., **Trucchia A.**, *Front Curvature Evolution and Hydrodynamics Instabilities*, Proceedings/Extended Abstract Book (6 pages) of the XXXX Meeting of the Italian Section of the Combustion Institute, Rome, Italy, 2017-06-07

Book Chapters

○ Vera N. Egorova, **Andrea Trucchia**, Gianni Pagnini, *Physical Parametrisation of Fire-Spotting for Operational Wildfire Simulators*, *Applied Mathematics for Environmental Problems*, Print ISBN: 978-3-030-61794-3, Electronic ISBN: 978-3-030-61795-0, Copyright Year: 2021

Editorial Duties

I have been reviewing papers for the subsequent journals:
○ Atmosphere

- Fire
- Processes
- European Physical Journal Plus
- Stochastic Environmental Research and Risk Assessment
- Sustainability

Memberships

- I am member of SIMAI - Italian Society for Applied Mathematics.

Outreach

Invited Talks

- Co-Convener at EGU General Assembly 2020 and EGU General Assembly 2022 (`https://www.egu22.eu/`)
- Presentation "Wildfire susceptibility mapping via machine learning: the case study of Liguria Region, Italy" at EGU General Assembly 2020 (held Online), https://doi.org/10.5194/egusphere-egu2020-18802, 4-8 May 2020
- Seminar *"Uncertainty Quantification and Sensitivity Analysis of a Wild-land fire model"* delivered at Mathematics Department "Renato Caccioppoli" at Federico II University, Naples, Italy, November 2019
- Seminar *"Seeding and Dispersal of Planar Microbial Biofilms: a chance for modelling"* delivered at workshop *QBIO2019 - Quantitative Biomedicine for Health and Disease*, Bilbao, February 13th, 2019
- Talk *Uncertainty Quantification and Sensitivity Analysis for bacterial invasion in biofilm modeling* delivered at *SECOND BYMAT CONFERENCE: BRINGING YOUNG MATHEMATICIANS TOGETHER* May 20-24 2019, ICMAT, Universidad Autonoma de Madrid, Madrid, Spain.
- Talk *Uncertainty Quantification and Sensitivity Analysis for bacterial invasion in multi-species biofilms* delivered at *WASCOM 2019 - XX INTERNATIONAL CONFERENCE ON WAVES AND STABILITY IN CONTINUOUS MEDIA*, June 10-14, 2019,Maiori (SA), Italy.
- Seminar *"Surrogate-based Uncertainty Quantification and Sensitivity Analysis for Bacterial Invasion in Multi-species Biofilms"* at *BCAM LIGHT SEMINAR*, February 19th 2019, BCAM, Bilbao, Spain
- Presentation of seminar *"The role of the environment in front propagation"* at the *International Conference on Computational and Mathematical Methdos in Science and Engineering, CMMSE 2018* (July 9-14 2018, Rota, Cadiz, Spain)
- Seminar *"Surrogated - based Uncertainty Quantification and Sensitivity Analysis of a Wild-land fire model"* at *BCAM LIGHT SEMINAR*, May 3rd 2018, BCAM, Bilbao, Spain
- Talk *Surrogate Analysis of turbulence and fire spotting in wild-land fire modeling* delivered at *FIRST BYMAT CONFERENCE: BRINGING YOUNG MATHEMATICIANS TOGETHER* May 07-09 2018 , ICMAT, Universidad Autonoma de Madrid, Madrid, Spain.
- Presentation of seminar *Front propagation in random media* at the *GNFM XLI Mathematical Phyisics Summer School*, Ravello, Italy, 15/09/2016

Posters

- M. D'Andrea, P. Fiorucci, **A. Trucchia**. *PROPAGATOR: Lessons learnt from the ANYWHERE project and open issues*, ANYWHERE Final Conference, Bruxelles, 29th-30th October 2019
- Gianni Pagnini, Vera N. Egorova, **Andrea Trucchia**, Andrea Mentrelli and Inderpreet Kaur ,

Wildfire propagation modelling EGU 2018 (European Geosciences Union General Assembly 2018), Vienna, Austria, 8-13 Abril 2018.

○ V.N. Egorova, **A. Trucchia** and G. Pagnini, *Numerical simulations of fire-spotting: flame characteristics formulation,* XVIII Spanish-French School Jacques-Louis Lions about Numerical Simulation in Physics and Engineering, Las Palmas de Gran Canaria, 25-29 June 2018

○ **A. Trucchia**,V.N. Egorova, M.C. Rochoux and G. Pagnini, *Surrogate-based analysis of turbulence and fire spotting in wild-land fire modelling*, XVIII Spanish-French School Jacques-Louis Lions about Numerical Simulation in Physics and Engineering, Las Palmas de Gran Canaria, 25-29 June 2018

○ G. Pagnini, **A. Trucchia**, *Darrieus-Landau instabilities in the framework of the G-equation*, 8th European Combustion Meeting held in Dubrovnik, Croatia April 18-21 2017

○ **A. Trucchia**, L. Frunzo, G. Pagnini, *A Front Propagation Model For Phototropic Microbial Biofilms Dynamics*, at EUROBIOFILMS 2017: FITH EUROPEAN CONGRESS ON MICROBIAL BIOFILMS–BASIC AND CLINICAL ASPECTS. AMSTERDAM ,THE NETHERLANDS, 19-22 SEPTEMBER 2017.

Social Activities, press ....

○ Volunteer for organization of First Lego League at Mondragon Unibertsitatea, (Arrasate, Basque Country, Spain), January 19th 2019.

○ Disseminative talk for the students of the high school Solokoetxe, during their visit to the center on October 3rd , 2018. `https://bit.ly/2O5lriD`

○ Interview from a staff of "Lab 24 `http://www.rtve.es/alacarta/videos/lab24/`", a program of scientific divulgation of TVE (Spanish Television) that is emitted through Channel 24 Horas. Interview available at `http://www.rtve.es/alacarta/videos/lab24/lab24-pgm76-repor/4011444`

○ Student mentoring in visit from **LanAldi** (a guidance program that help students to address their future career), `http://www.bcamath.org/documentos_public/archivos/noticias/bcam_matematika-txokoa_seminar.pages.pdf`

○ Interview by media at Caixa Foundation Fellowship awarding ceremony `http://www.bcamath.org/documentos_public/archivos/noticias/La_Caixa_Fellowship_Ceremony_2016_TRUCCHIA.pages.pdf`, `https://elpais.com/ccaa/2016/06/28/catalunya/1467113669_352231.html`

Attended Workshops and seminars

BCAM, Basque Center for Applied Mathematics, May 28-31 2018 : Summer School on Fractional and Other Non-Local Models

University of Parma, May 20, 2016 : SPH methods for multiphase flows

National Research Council (CNR) Rome, Italy, 29/08/2016 : 124th European Study Group with Industry

BCAM, Basque Center for Applied Mathematics, 29/06/2016 - 01/07/2016: Summer School on Advanced Computation in Fluid Mechanics - "New Theory of Flight"

NORDITA - Royal Institut of Technology (KTH), Stockholm, Sweden, 26-30/09/2016 : International Combustion Institute Summer School (ICISS) on Physics of Turbulent Combustion

Ravello (NA), Italy, 05-17/09/2016 : (GNFM) XLI Mathematical Physics Summer School

MOX, Politecnico di Milano, March 1 - 2 2016 : Workshop on Semi-implicit and semi-Lagrangian methods for hyperbolic problems

BCAM, Basque Center for Applied Mathematics, November 18, 2015: 3rd Fractional Calculus, Probability and Non-Local Operators: Applications and Recent Developments

BCAM, Basque Center for Applied Mathematics, November 23, 2015: 4th Fractional Calculus, Probability and Non-Local Operators: Applications and Recent Developments