

Bulut Tekgül

CFD ENGINEER, POSTDOCTORAL RESEARCHER

Argonne National Laboratory, Lemont, IL, USA

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Education

Aalto University

DOCTOR OF PHILOSOPHY IN MECHANICAL ENGINEERING

Espoo, Finland

Aug 2017 - May 2021

- CFD code and model development
- Numerical combustion
- Large-eddy simulation
- Combustion chemistry
- HPC applications and data analysis

Middle East Technical University

MASTER OF SCIENCE IN MECHANICAL ENGINEERING (3.10/4.00)

Ankara, Turkey

Sep 2015 - Nov 2017

- Master thesis titled "On the applicability of progress variable approach for large eddy simulation of premixed flames"

Middle East Technical University

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING (2.99/4.00)

Ankara, Turkey

Sep 2009 - Jun 2015

Experience

Argonne National Laboratory

POSTDOCTORAL RESEARCHER

Illinois, USA

Jun 2021 - Present

- Numerical analysis of active and passive pre-chamber combustion engines
- Analysis and geometry optimization of ethanol-fueled compression ignition engines

Aalto University

DOCTORAL CANDIDATE

Espoo, Finland

Feb 2017 - May 2021

- Completed master thesis as a visiting student and part time teaching assistant
- Ignition characteristics dual-fuel combustion systems
- Large-eddy simulation of spray combustion
- Scientific computing and code development

Roketsan Missiles

MECHANICAL DESIGN ENGINEER

Ankara, Turkey

Nov. 2015 - Feb. 2017

- CAD design of a wide range of mechanical parts used in several projects
- Aerodynamic and structural analysis using FEM and CFD
- Creating technical drawings and assembly instructions for mechanical systems
- Quality control of mechanical parts produced by 3rd party suppliers

Research Efforts

Publications

- **B. Tekgül**, Numerical studies for diesel spray assisted methane ignition at low temperature conditions, Doctoral Thesis, 2021.
- **B. Tekgül**, P. Peltonen, H. Kahila, O. Kaario, V. Vuorinen, DLBfoam: An open-source dynamic load balancing model for fast reacting flow simulations in OpenFOAM, Comp. Phys. Comms., 2021.
- **B. Tekgül**, H. Kahila, O. Kaario, E. Lendormy, J. Hyvönen and V. Vuorinen, Large-eddy simulation of spray assisted dual-fuel ignition under reactivity-controlled dynamic conditions, Fuel, 2021.
- M. Gadalla, J. Kannan, **B. Tekgül**, S. Karimkashi, O. Kaario, and V. Vuorinen, Large-eddy simulation of tri-fuel combustion: Diesel spray assisted ignition of methanol-hydrogen blends, Int. J. Hydrogen Energy, 2021.
- D. Izbassarov, J. Nyari, **B. Tekgül**, E. Laurila, T. Kallio, A. Santasalo-Aarnio, O. Kaario and V. Vuorinen, A numerical performance study of a fixed-bed reactor for methanol synthesis by CO₂ hydrogenation, Int. J. Hydrogen Energy, 2021.
- J. Kannan, M. Gadalla, **B. Tekgül**, S. Karimkashi, O. Kaario and V. Vuorinen, Large-eddy simulation of tri-fuel ignition: diesel spray-assisted ignition of lean hydrogen-methane-air mixtures, Comb. Theory and Modelling, 2021.
- **B. Tekgül**, H. Kahila, O. Kaario and V. Vuorinen, Large-eddy simulation of dual-fuel spray ignition at different ambient temperatures, Comb. and Flame, Vol. 215, 2020.
- J. Kannan, M. Gadalla, **B. Tekgül**, S. Karimkashi, O. Kaario and V. Vuorinen, Large eddy simulation of diesel spray-assisted dual-fuel ignition: A comparative study on two n-dodecane mechanisms at different ambient temperatures, Intl. J. Engine Research, 2020.
- M. Gadalla, J. Kannan, **B. Tekgül**, S. Karimkashi, O. Kaario and V. Vuorinen, Large-eddy simulation of ECN Spray A: sensitivity study on modeling assumptions, Energies, 2020.
- H. Kahila, O. Kaario, Z. Ahmad, M. Ghaderi Masouleh, **B. Tekgül**, M. Larimi and V. Vuorinen, A large-eddy simulation study on the influence of diesel pilot spray quantity on methane-air flame initiation, Comb. and Flame, 2019.

Submitted Papers

- I. Morev, **B. Tekgül**, M. Gadalla, A. Shahanaghi, J. Kannan, S. Karimkashi, O. Kaario and V. Vuorinen, Fast reactive flow simulations using analytical Jacobian and dynamic load balancing in OpenFOAM (Under review, available on arXiv).
- **B. Tekgül**, S. Karimkashi, O. Kaario, H. Kahila, E. Lendormy, J. Hyvönen and V. Vuorinen, Large-eddy simulation of split injection strategies in RCCI conditions (Under review).
- S. Karimkashi, M. Gadalla, J. Kannan, **B. Tekgül**, H. Kahila, O. Kaario and V. Vuorinen, Large-eddy simulation of diesel pilot injection into lean methane-air and methanol-air mixtures at different ambient temperatures (Under review).

Workshops & Conferences

- 10th European Combustion Meeting, Napoli, 2021 - A load balanced chemistry model with analytical Jacobian for faster reactive simulations in OpenFOAM (Manuscript and presentation).
- 16th OpenFOAM Workshop, Dublin, 2021 - A dynamic load balancing model with analytical Jacobian for fast combustion simulations in OpenFOAM (Extended abstract and presentation).
- Nordic Flame Days, Turku-Finland, 2019 - Combustion characteristics of diesel sprays under RCCI conditions, (Extended abstract and oral presentation).
- 17th International Conference on Numerical Combustion, Aachen-Germany, 2019 - Oral presentation on LES analysis of ambient temperature effect on diesel spray ignition in methane-air mixtures
- Finnish Flame Days, Espoo-Finland, 2018 - Oral presentation on influence of temperature on diesel spray ignition in methane-air mixtures
- Finnish OpenFOAM User Day, Espoo-Finland, 2018 - Oral presentation on premixed combustion analysis using XiFoam.
- Princeton-Combustion Institute Summer School, Princeton-USA, 2018 - Poster presentation on LES of dual-fuel spray combustion

Teaching

- AAE-E3030 - Numerical Modeling of Multiphase Flows (Lecturer and course assistant)
- EEN-E2001 - Computational Fluid Dynamics (Course assistant)
- EEN-E1020 - Heat Transfer (Course assistant)

Skills

Programming Language	Python, C++, Fortran, MATLAB
Software	OpenFOAM, CONVERGE CFD, CAESSES, MATLAB, Cantera, Chem1D, Ember, CATIA, SolidWorks, COMSOL
Language	English (Full professional proficiency), Turkish (Native), Finnish (Elementary proficiency)

Honors & Awards

Awards

- Merenkulun säätiö, Research grant award, 2019.