

August 2020

Mehmet Sarp Yalim, Ph.D. in Engineering Sciences

EDUCATION AND DEGREES: BS (2000) and MS (2002) with *High honor* in Mechanical Engineering, Department of Mechanical Engineering at Middle East Technical University, Ankara, Turkey (CGPA – BS: 3.56/4 & CGPA – MS: 3.93/4); Diploma course in Aeronautics and Aerospace with *Honours*, Department of Aeronautics and Aerospace at von Karman Institute for Fluid Dynamics, Sint-Genesius-Rode, Belgium (2004) (Overall grade: 82/100); Ph.D. in Engineering Sciences, Faculty of Applied Sciences, Free University of Brussels (ULB), Brussels, Belgium (2008).

RESEARCH INTERESTS: Observational solar physics, solar atmosphere modeling, space weather, computational fluid dynamics, numerical methods, scientific code development, parallel computing.

CURRENT POSITION: Research Scientist I, The University of Alabama in Huntsville (UAH), Center for Space Plasma and Aeronomic Research (CSPAR)

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SELECTED WORK EXPERIENCE: Postdoctoral Research Assistant, CSPAR, UAH, Huntsville, AL, Jul 2015-Mar 2019; Postdoctoral Research Associate, Center for mathematical Plasma Astrophysics, Catholic University of Leuven (KU Leuven), Leuven, Belgium, Dec 2008-Jul 2009 and Nov 2009-Dec 2013; Research Assistant, Department of Solar Physics, Royal Observatory of Belgium, Brussels, Belgium, Aug 2009-Oct 2009

SYNERGISTIC ACTIVITIES: Reviewer for NSF proposals (2020); Reviewer for AAS Journals (2017-), Experimental Astronomy Journal (2014); Program Coordinator - UAH CSPAR/NASA MSFC Heliophysics NSF REU Program (May 2019-)

AWARDS & GRANTS: S.T. Wu CSPAR Performance Award (2019); “Development of a Data-driven Magnetohydrodynamic Simulation Model for Flux-Emerging Active Regions Leading to Coronal Mass Ejections” (NSF AGS-2020703) - \$437,188

GRADUATE STUDENTS: Advisor: Talwinder Singh (UAH); Michel Rasquin, Radka Keslerova (von Karman Institute for Fluid Dynamics)

TEACHING ACTIVITIES:

Spring 2020 Assisted Prof. Dr. Nikolai Pogorelov in his graduate level course “Astrophysical Fluid Dynamics” at the Department of Space Science, UAH by giving lectures and proctoring exams.

Fall 2019 Assisted Prof. Dr. Nikolai Pogorelov in his graduate level course “Introduction to Plasma Physics” at the Department of Space Science, UAH by giving lectures.

Summer 2019 Gave a lecture and a tutorial on “Introduction to Space Weather” to the NSF REU students in the frame of the UAH CSPAR/NASA MSFC Heliophysics NSF REU program; as the Program Coordinator, scheduled and coordinated lectures, tutorials and activities for the REU students, chaired progress meetings, and poster and presentation sessions.

Spring 2017 Assisted Prof. Dr. Nikolai Pogorelov in his graduate level course “CFD&MHD” by giving lectures at the Department of Space Science, UAH.

Fall 2015 Assisted Prof. Dr. Nikolai Pogorelov in his graduate level course “Introduction to Plasma Physics” at the Department of Space Science, UAH by giving lectures, grading homework assignments and proctoring exams.

Spring 2013 Assisted Prof. Dr. Stefaan Poedts as advisor of the Bachelor’s thesis project entitled “Exploring Solar Coronal Magnetic Fields Using PFSS Model” for mathematics and physics undergraduate students at the Catholic University of Leuven, Belgium. Accordingly, organized weekly progress meetings, prepared tutorials and taught the essential material for the realization of the project topic and guided the students through the realization of their projects as well as proofread their project reports.

2011-2013 Assisted Prof. Dr. Stefaan Poedts in his graduate-level course for mathematics and physics students entitled “Plasma Physics of the Sun” (B- KUL- G0B28A) at the Catholic University of Leuven, Belgium.

PUBLICATIONS:

Peer-reviewed Journal Papers:

1. **Yalim, M. S.**; Prasad, A.; Pogorelov, N. V.; Zank, G. P.; Hu, Q.; Effects of Cowling resistivity in the weakly ionized chromosphere, *The Astrophysical Journal Letters*, 899, L4 doi:10.3847/2041-8213/aba69a (2020)
2. Singh, T.; **Yalim, M. S.**; Pogorelov, N. V.; Gopalswamy, N.; A modified spheromak model suitable for coronal mass ejection simulations, *The Astrophysical Journal*, 894, 49, doi:10.3847/1538-4357/ab845f (2020)
3. Singh, T.; **Yalim, M. S.**; Pogorelov, N. V.; Gopalswamy, N.; Simulating solar coronal mass ejections constrained by observations of their speed and poloidal flux, *The Astrophysical Journal Letters*, 875, L17, doi:10.3847/2041-8213/ab14e9 (2019)
4. Singh, T.; **Yalim, M. S.**; Pogorelov, N. V.; A data-constrained model for coronal mass ejections using the Graduated Cylindrical Shell method, *The Astrophysical Journal*, 864, 18, doi:10.3847/1538-4357/aad3b4 (2018)
5. **Yalim, M. S.**; Poedts, S.; Variations in EUV irradiance: Comparison between LYRA, ESP and SWAP integrated flux, *Advances in Astronomy*, Article ID 957461, p. 1, doi:10.1155/2014/957461 (2014)
6. Lani, A.; **Yalim, M. S.**; Poedts, S.; A GPU-enabled finite volume solver for global magnetospheric simulations on unstructured grids, *Computer Physics Communications*, 185(10), p. 2538, doi:10.1016/j.cpc.2014.06.001 (2014)
7. Seaton, D. B.; Berghmans, D.; Nicula, B.; Halain, J.-P.; De Groof, A.; Thibert, T.; Bloomfield, D. S.; Raftery, C. L.; Gallagher, P. T.; Auchère, F.; Defise, J.-M.; D’Huys, E.; Lecat, J.-H.; Mazy, E.; Rochus, P.; Rossi, L.; Schühle, U.; Slemzin, V.; **Yalim, M. S.**; Zender, J.; The SWAP EUV imaging telescope Part I: Instrument overview and pre-flight testing, *Solar Physics*, 286(1), p. 43, doi:10.1007/s11207-012-0114-6 (2013)

8. Zender, J.; Berghmans, D.; Bloomfield, D. S.; Cabanas Parada, C.; Dammasch, I.; De Groof, A.; D'Huys, E.; Dominique, M.; Gallagher, P.; Giordanengo, B.; Higgins, P. A.; Hochedez, J.-F.; **Yalim, M. S.**; Nicula, B.; Pylyser, E.; Sanchez-Duarte, L.; Schwehm, G.; Seaton, D. B.; Stanger, A.; Stegen, K.; Willems, S.; The Projects for Onboard Autonomy (PROBA2) science centre: Sun Watcher Using APS Detectors and Image Processing (SWAP) and Large-Yield Radiometer (LYRA) science operations and data products, *Solar Physics*, 286(1), p. 93, doi:10.1007/s11207-012-00336 (2013)
9. **Yalim, M. S.**; Vanden Abeele, D.; Lani, A.; Quintino, T.; Deconinck, H.; A finite volume implicit time integration method for solving the equations of ideal magnetohydrodynamics for the hyperbolic divergence cleaning approach, *Journal of Computational Physics*, 230(15), p. 6136, doi:10.1016/j.jcp.2011.04.020 (2011)

Peer-reviewed Conference Proceedings Papers:

1. **Yalim, M. S.**; Prasad, A.; Pogorelov, N. V.; Zank, G. P.; Hu, Q.; A data-driven MHD model of the weakly-ionized chromosphere, *Journal of Physics: Conference Series* (accepted) (arXiv:2007.12361)
2. **Yalim, M. S.**; Pogorelov N. V.; Liu Y.; A data-driven MHD model of the global solar corona within Multi-Scale Fluid-Kinetic Simulation Suite (MS-FLUKSS), *Journal of Physics: Conference Series*, Vol. 837, No. 1, IOP Publishing, doi: 10.1088/1742-6596/837/1/012015 (2017)
3. Pogorelov, N. V.; Borovikov, S. N.; Kryukov, I. A.; Wu, S. T.; **Yalim, M. S.**; Colella, P. C.; Van Straalen, B.; Modeling coronal mass ejections with the Multi-Scale Fluid-Kinetic Simulation Suite, *Journal of Physics: Conference Series*, Vol. 837, No. 1, IOP Publishing, doi:10.1088/1742-6596/837/1/012014 (2017)
4. **Yalim, M. S.**; Poedts, S.; 3D global magnetohydrodynamic simulations of the solar wind/Earth's magnetosphere interaction, In “*8th International Conference of Numerical Modeling of Space Plasma Flows (ASTRONUM 2013)*”, eds. Edouard Audit, Nikolai V. Pogorelov, and Gary P. Zank, Astronomical Society of the Pacific (ASP) Conference Series, Vol. 488, ISBN 9781583818602, p. 192 (2014)
5. Lani, A.; Villedieu, N.; Bensassi, K.; Koloszar, L.; Vymazal, M.; **Yalim, M. S.**; Panesi, M.; COOLFluid: An open computational platform for multi-physics simulation and research, *21st AIAA Computational Fluid Dynamics Conference*, San Diego, CA, USA, 24-27 June 2013, AIAA-2013-2589, doi: 10.2514/6.2013-2589 (2013)
6. **Yalim, M. S.**; Vanden Abeele, D.; Lani; A. Simulation of field-aligned ideal MHD flows around perfectly conducting cylinders using an artificial compressibility approach, In “*Proceedings of the 11th International Conference on Hyperbolic Problems held in Ecole Normale Supérieure, Lyon, France, 17-21 July 2006*”, eds. Sylvie Benzoni-Gavage, Denis Serre, Springer-Verlag, 2008, ISBN 978-3-540-75711-5, p.1085 (2008)

Meeting Papers:

1. **Yalim, M. S.**; Deconinck, H.; Poedts, S.; Solution of compressible ideal MHD equations and application in solar-wind/planetary-magnetosphere interactions, In “*Contactforum Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten (KVAB) Modern Techniques for Solving Partial Differential Equations, Brussels, Belgium, 19 June 2008*”, eds. Chris Lacor, Eli Turkel, Universa Press, 2008, ISBN 9789065690418, p. 89 (2008)

2. **Yalim, M. S.;** Vanden Abeele, D.; Deconinck, H.; Simulation of solar wind/earth magnetosphere interaction using an artificial compressibility approach, *15th Annual Conference of the CFD Society of Canada*, Ontario, Canada, 27-31 May 2007, VKI RP 2007-71 (2007)
3. **Yalim, M. S.;** Vanden Abeele, D.; Deconinck, H.; Simulation of solar wind/earth magnetosphere interaction using an artificial compressibility approach, In "*2nd European Conf. for Aerospace Sciences*" Riethmuller M.L., ed., von Karman Institute for Fluid Dynamics, 2007, ISBN 978-2-93038927-3, Paper 2-26 (2007)
4. **Yalim, M. S.;** Vanden Abeele, D.; Deconinck, H.; An artificial compressibility method for compressible ideal magnetohydrodynamics equations, *4th Ankara International Aerospace Conference (AIAC)*, Ankara, Turkey, 10-12 September 2007, AIAC-2007-067, VKI RP 2007-72 (2007)

Posters, Seminars and Talks:

1. **Yalim, M. S.;** Vanden Abeele, D.; Lani; A. Simulation of field-aligned ideal MHD flows around perfectly conducting cylinders using an artificial compressibility approach, *11th International Conference on Hyperbolic Problems*, Lyon, France, 17-21 July 2006 (*Talk*)
2. **Yalim, M. S.;** Vanden Abeele, D.; Deconinck, H.; Simulation of solar wind/earth magnetosphere interaction using an artificial compressibility approach, *15th Annual Conference of the CFD Society of Canada*, Ontario, Canada, 27-31 May 2007 (*Talk*)
3. **Yalim, M. S.;** Vanden Abeele, D.; Deconinck, H.; Simulation of solar wind/earth magnetosphere interaction using an artificial compressibility approach, *2nd European Conference for Aerospace Sciences*, Brussels, Belgium, 1-6 July 2007 (*Poster*)
4. **Yalim, M. S.;** Vanden Abeele, D.; Deconinck, H.; An artificial compressibility method for compressible ideal magnetohydrodynamics equations, *4th Ankara International Aerospace Conference (AIAC)*, Ankara, Turkey, 10-12 September 2007 (*Talk*)
5. **Yalim, M. S.;** Deconinck, H.; Poedts, S.; Solution of compressible ideal MHD equations and application in solar-wind/planetary-magnetosphere interactions, *Contactforum Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten (KVAB) Modern Techniques for Solving Partial Differential Equations*, Brussels, Belgium, 19 June 2008 (*Talk*)
6. Bonte, K.; **Yalim, M. S.;** Berghmans, D.; De Groof, A.; Statistical analysis of variability in SWAP image sequences, *PROBA2 Science Working Team*, CESRA 2010, La Roche-en-Ardenne, Belgium, 14-16 June 2010 (*Talk*)
7. Dammasch, I. E.; **Yalim, M. S.;** De Groof, A.; Seaton, D. B.; Berghmans, D.; Dominique, M.; Solar irradiance variations of an active region observed with SWAP and LYRA, *7th European Space Weather Week*, Brugge, Belgium, 15-19 November 2010 (*Poster*)
8. **Yalim, M. S.;** Poedts, S.; Simulating solar wind/planetary magnetosphere interaction using a finite volume implicit time integration method for solving the ideal MHD equations for the hyperbolic divergence cleaning approach, Katholieke Universiteit Leuven, Department of Mathematics, 15 November 2011 (*Seminar*)
9. **Yalim, M. S.;** Poedts, S.; A 3D global magnetohydrodynamic simulation of the solar wind/Earth's magnetosphere interaction, *9th European Space Weather Week*, Brussels, Belgium, 5-9 November 2012 (*Talk*)
10. **Yalim, M. S.;** Poedts, S.; *28th Flemish Mathematics Olympics Poster*, 2013 (*Poster*)

11. **Yalim, M. S.**; Poedts, S.; 3D global magnetohydrodynamic simulations of the solar wind/Earth's magnetosphere interaction, Katholieke Universiteit Leuven, Department of Mathematics, 18 June 2013 (*Seminar*)
12. **Yalim, M. S.**; Poedts, S.; 3D global MHD simulations of the solar wind/Earth's magnetosphere interaction, 8th *ASTRONUM Conference*, Biarritz, France, 1-5 July 2013 (*Talk*)
13. **Yalim, M. S.**; Frère, A.; Goffaux, C.; CFD simulation of the three-dimensional effects induced by the NO_x photocatalytic degradation for isolated building and street-canyon configurations, *Third International Conference on Countermeasures to Urban Heat Island*, Venice, Italy, 13-15 October 2014 (*Talk*)
14. **Yalim, M. S.**; Pogorelov, N. V.; Hu, Q.; Liu, Y.; Wu, S. T.; A global solar corona model in the Multi-Scale Fluid-Kinetic Simulation Suite, 11th *ASTRONUM Conference*, Monterey, CA, USA, 6-10 June 2016 (*Talk*)
15. **Yalim, M. S.**; Pogorelov, N. V.; Hu, Q.; Liu, Y.; Wu, S. T.; A data-driven MHD model of global solar corona within Multi-Scale FLUID-Kinetic Simulation Suite (MS-FLUKSS), 4th *NCSA Blue Waters Symposium for Petascale Science and Beyond*, Sunriver, OR, USA, 13-15 June 2016 (*Poster*)
16. **Yalim, M. S.**; Pogorelov, N. V.; Hu, Q.; Liu, Y.; Wu, S. T.; Coronal model drivers: a fistful of maps, *SHINE Conference 2016*, Santa Fe, NM, USA, 11-15 July 2016 (*Talk*)
17. **Yalim, M. S.**; Pogorelov, N. V.; Liu, Y.; Hu, Q.; Wu, S. T.; A data-driven MHD model of global solar corona within Multi-Scale FLUID-Kinetic Simulation Suite (MS-FLUKSS), Stanford University, W. W. Hansen Experimental Physics Laboratory, Palo Alto, CA, USA, 17 August 2016 (*Seminar*)
18. **Yalim, M. S.**; Pogorelov, N. V.; Liu, Y.; Hu, Q.; Wu, S. T.; A new characteristic boundary condition formulation for a data-driven magnetohydrodynamic model of global solar corona using SDO vector magnetogram data, *SDO 2016: Unraveling the Sun's Complexity*, Burlington, VT, USA, 17-21 October 2016 (*Talk*)
19. **Yalim, M. S.**; Pogorelov, N. V.; Liu, Y.; Hu, Q.; Wu, S. T.; A data-driven characteristically-consistent MHD model fed by SDO/HMI vector magnetograms, *AGU Fall 2016 Meeting*, San Francisco, CA, USA, 12-16 December 2016 (*Poster*)
20. **Yalim, M. S.**; Pogorelov, N. V.; Singh, T.; Liu, Y.; Coronal mass ejections in a data-driven global magnetohydrodynamic model, *Applied Space Environments Conference (ASEC) 2017*, Huntsville, AL, USA, 15-19 May 2017 (*Talk*)
21. Pogorelov, N. V.; Hathaway, D. H.; Kim, T. K.; Liu, Y.; Singh, T.; **Yalim, M. S.**; A data-driven model of the solar atmosphere and heliosphere, *Solar Heliospheric & Interplanetary Environment (SHINE) Conference 2017*, Saint-Sauveur, Quebec, Canada, 24-28 July 2017 (*Poster*)
22. **Yalim, M. S.**; Pogorelov, N. V.; Liu, Y.; Hathaway, D. H.; Singh, T.; On the importance of a mathematically-consistent implementation of boundary conditions derived from vector magnetograms, *Second Working Meeting on Use of Vector Synoptic Maps for Modeling*, NSO, Boulder, CO, USA, 6-10 November 2017 (*Talk*)
23. **Yalim, M. S.**; Pogorelov, N. V.; Singh, T.; Liu, Y.; Data-driven model of the ICME propagation through the solar corona and inner heliosphere, SH23D-2698, *AGU Fall 2017 Meeting*, New Orleans, LO, USA, 11-15 December 2017 (*Poster*)
24. Singh, T.; **Yalim, M. S.**; Pogorelov, N. V.; CME simulations with boundary conditions derived from multiple viewpoints of STEREO, SH53A-2545, *AGU Fall 2017 Meeting*, New Orleans, LO, USA, 11-15 December 2017 (*Poster*)

25. Canner, A.; Kim, T. K.; Pogorelov, N. V.; **Yalim, M. S.**; Analysis of solar coronal holes with synoptic magnetogram data, SH23D-2702, *AGU Fall 2017 Meeting*, New Orleans, LO, USA, 11-15 December 2017 (*Poster*)
26. **Yalim, M. S.**; Data-driven magnetohydrodynamic modeling of solar corona and the solar wind/Earth's magnetosphere interaction, *Joint Space Weather Summer Camp 2018*, UAH/CSPAR, 17 July 2018. (*Seminar*)
27. **Yalim, M. S.**; Pogorelov, N. V.; Liu, Y.; Zank, G. P.; Data-driven model of global solar corona based on vector magnetogram data, SH23C-3335, *AGU Fall 2018 Meeting*, Washington DC, USA, 10-14 December 2018 (*Poster*)
28. Singh, T.; **Yalim, M. S.**; Pogorelov, N. V.; Sun to Earth MHD simulation of a CME model constrained by observed mass, speed and poloidal flux, SH51D-2854, *AGU Fall 2018 Meeting*, Washington DC, USA, 10-14 December 2018 (*Poster*)
29. **Yalim, M. S.**; Data-driven magnetohydrodynamic modeling of solar wind propagation – from chromosphere to Earth's magnetosphere, *CPU2AL Speaker Series*, Huntsville, AL, USA, 24 January 2019 (*Colloquium*)
30. **Yalim, M. S.**; Pogorelov, N. V.; Zank, G. P.; Maurer, D.; Data-driven MHD model of solar chromosphere and laboratory plasmas as LTP, *2019 CPU2AL Science and Technology Open House*, Mobile, AL, USA, 3-5 April 2019 (*Poster*)
31. **Yalim, M. S.**; Introduction to space weather, *UAH CSPAR/NASA MSFC Heliophysics NSF REU Program – Summer 2019*, Huntsville, AL, USA, 30 May 2019 (*Lecture*)
32. **Yalim, M. S.**; Space weather forecasting – Training session, *UAH CSPAR/NASA MSFC Heliophysics NSF REU Program – Summer 2019*, Huntsville, AL, USA, 11 June 2019 (*Lecture*)
33. **Yalim, M. S.**; AGU conference & posters, *UAH CSPAR/NASA MSFC Heliophysics NSF REU Program – Summer 2019*, Huntsville, AL, USA, 2 July 2019 (*Lecture*)
34. **Yalim, M. S.**; Overview of data-driven MHD models of solar wind propagation from chromosphere to Earth's magnetosphere, *NSSTC Space Science Seminar*, Huntsville, AL, USA, 17 September 2019 (*Seminar*)
35. **Yalim, M. S.**; Pogorelov, N. V.; Zank, G. P.; Adhikari, L.; Data-driven MHD model of global solar corona and inner heliosphere with nearly incompressible MHD turbulence coronal heating, *AGU Fall 2019 Meeting*, San Francisco, CA, USA, 9-13 December 2019 (*Poster*)
36. **Yalim, M. S.**; Prasad, A.; Pogorelov, N. V.; Zank, G. P.; Effects of Cowling resistivity in the weakly-ionized chromosphere, *19th Annual International Astrophysics Conference*, Santa Fe, NM, USA, 9-13 March 2020 (*Talk*)