Hasan H. Eruslu

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Education

Ph.D. in Applied Mathematics. University of Delaware, Newark, DE (Expected) May 2020
Thesis: *Numerical analysis of viscoelastic wave propagation*

M.S. in Mathematics. Bogazici University, Istanbul, Turkey June 2015
Thesis: *An optimal change of variables scheme for single scattering problems*

B.S. in Mathematics. Bogazici University, Istanbul, Turkey June 2012

Work Experience

Research Assistant 2018-Present
University of Delaware, Department of Mathematical Sciences Newark, DE

- Studied the deformation of viscoelastic solids. Designed **the first known unified numerical approximation algorithm** for all viscoelastic models including fractional-in-time models.
- Built a **parallel-in-time MATLAB solver** that can approximate the motion of a viscoelastic solid within an error of 10^{-8} units. **Developed tools to simulate** 2D and 3D material deformation and stress.
- **Published 2 papers, 3 posters**, which in total received 15 citations, 1 poster award.
- Results can be found at: heruslu.github.io/projects

Software Developer Intern Summer 2018 and Summer 2019
Theiss Research, National Institute of Standards and Technology (NIST) Gaithersburg, MD

- Started the development of **Python-based object-oriented visual recognition software** that segments the surface of objects in given images. Focus is on material images and to help material design experiments at NIST.
- Designed an adaptive FEM-based solver using an iterative energy minimization algorithm that **efficiently distributes the computational power** depending on object details.
- Implemented NumPy-based vectorization tools to process the mesh data, and an innovative way of computing the norm of the numerical gradient, which **reduced the costs by 90**% compared to the solver with standard build-in tools.
- Built an efficient **git workflow** to add features, fix bugs, handle versioning. Started the automation of tests with PyTest.
- **Resolved surfaces of objects** (with cavities, thin walls and sharp corners) within 50% of the object edge-width in synthetic and real image data. (See heruslu.github.io/projects)

Projects

Software for solving PDEs 2015-2019
Team Pancho (team-pancho.github.io), University of Delaware Newark, DE
A research group of 1 professor and 5-7 graduate students that builds MATLAB-based software for scientific computation.

- Took an **active role** in the development of libraries for solving electromagnetic, acoustic and elastic wave propagation problem using HDG and FEM methods. **Planned, designed, and maintained multiple modules** of the software.
- **Led sub-teams** inside the group to build fast and parallelized algorithms that achieves optimal numerical solutions.
- Designed better simulations tools. **Decreased the time complexity** to build 3D animations by one order of magnitude.
- Initiated and **maintained the team website** and repositories on GitHub. Set up workflow rules, coordinated the responsibilities of master branch control.

Skills & Relevant Coursework

Software. (Proficient) Python, MATLAB, NumPy/SciPy, Git/GitHub, HTML, LaTeX.
(Previously used) C/C++, Java, Fortran, OpenMP, MPI, OpenGL, Linux/Unix.
Mathematics. Real Analysis; Numerical Analysis; Linear Algebra; Discrete Math.; Probability; Statistics; Graph Theory.
Computer Science. Advanced Algorithms; Data Structures; OOP; Operating Systems; Machine & Deep Learning.
Teaching/Presentations. Taught calculus for STEM majors for 5 years with 95% rating of excellence in student evaluations. Gave 6 seminars, participated 3 panels about research and graduate student life.

Honors and Awards

University Dissertation Fellowship Award 2019-2020
UD. Excellence in Graduate Student Teaching Award (University-wide top 2 instructors) 2018
TUBITAK Undergraduate and Graduate Scholarship 2006-2015
International Mathematical Olympiads (IMO), Silver Medal 2006