New Trends in Scientific Computing

Wednesday April 20, 2022

8:00–8:50 *Check-In/Light Breakfast (Hosted by IPAM)*

8:50–9:00 *Welcome & Opening Remarks: Dean Miguel García-Garibay (Dean of Physical Sciences, UCLA) and Dima Shlyakhtenko (Director, IPAM)*

9:00 *Session Chair: Frederic Gibou (University of California, Santa Barbara)*

9:00–9:25 **Bjorn Engquist** (University of Texas at Austin)
Global convergence of stochastic gradient descent

9:30–9:55 **Yann Brenier** (Centre National de la Recherche Scientifique (CNRS))
Virtual Talk: From the Monge transportation problem to Einstein's gravitation through Euler's Hydrodynamics

10:00–10:15 *Break*

10:15–10:40 **Chi-Wang Shu** (Brown University)
Shock capturing methods for CFD: a review of Osher's contributions

10:45–11:10 **Tom Goldstein** (University of Maryland)
TBA

11:15–11:30 *Break*

11:30–11:55 **Hongkai Zhao** (Duke University)
How much can one learn a PDE from its solution data

12:00–2:00 *Lunch (on your own)*

2:00 *Session Chair: Andrea Bertozzi (University of California, Los Angeles)*

2:00–2:25 **Thomas Hou** (California Institute of Technology)
Potentially singular behavior of 3D incompressible Euler equations and Navier-Stokes equations

2:30–2:55 **Wuchen Li** (University of South Carolina)
Controlling regularized conservation laws via entropy-entropy flux

3:00–3:30 *Break*

3:30–3:55 **Chiu-Yen Kao** (Claremont McKenna College)
TBA

4:00–4:25 *Lightning Poster Presentations (90 seconds each)*

4:30–6:00 *Poster Session & Reception (Hosted by IPAM)*

Thursday April 21, 2022

8:00–9:00	*Check-in/Breakfast (hosted by IPAM)*
9:00	*Session Chair: Chi-Wang Shu (Brown University)*
9:00–9:25	**Eli Yablonovitch** (University of California, Berkeley (UC Berkeley)) *Physics Does Digital Optimization—which we call Onsager Computing— for Machine Learning, Control Theory, Backpropagation, etc.*
9:30–9:55	**Andrea Bertozzi** (University of California, Los Angeles (UCLA)) *The MBO scheme on graphs for semi-supervised and unsupervised machine learning*
10:00–10:15	*Break*
10:15–10:40	**Ron Fedkiw** (Stanford University) *TBA*
10:45–11:10	**Wilfrid Gangbo** (University of California, Los Angeles (UCLA)) *Finite dimensional approximations of Hamilton-Jacobi-Bellman equations in spaces of probability measures*
11:15–11:30	*Break*
11:30–11:55	**Inwon Kim** (University of California, Los Angeles (UCLA)) *“MBO scheme with Wasserstein distance”*
12:00–2:00	*Lunch (on your own)*
2:00	*Session Chair: Wotao Yin (University of California, Los Angeles)*
2:00–2:25	**Guillermo Sapiro** (Duke University) *Scientific computing for real health challenges*
2:30–2:55	**Frederic Gibou** (University of California, Santa Barbara (UCSB)) *Level-set methods and some recent development - a tribute to Stan Osher*
3:00–3:30	*Break*
3:30–3:55	**Russel Caflisch** (New York University) *An Adjoint Method for the Nonlinear Boltzmann Equation*
4:00–4:25	**Rongjie Lai** (Rensselaer Polytechnic Institute) *Learning Manifold-structured Data via Geometry Inspired DNNs*
4:45–5:15	*Group Photo*
5:30–8:30	*Banquet at the Faculty Center*

Friday April 22, 2022

8:00–9:00	*Check-in/Breakfast (hosted by IPAM)*
9:00	*Session Chair: Chi-Wang Shu (Brown University)*
9:00–9:25	**Lawrence (Craig) Evans** (University of California, Berkeley (UC Berkeley)) *Compensated compactness and 3-webs*
9:30–9:55	**Myungjoo Kang** (Seoul National University) *Recent Developments of solving PDE using Neural Networks*
10:00–10:15	*Break*
10:15–10:40	**Barry Merriman** (Roswell Biotechnologies) *From Motion by Mean Curvature to PDEs on Point Clouds: 30 Years of BMO[sher]*
10:45–11:10	**Fariba Fahroo** (Air Force Office of Scientific Research (AFOSR)) *Virtual Talk:*
11:15–11:30	*Break*
11:30–11:55	**Richard Tsai** (University of Texas at Austin) *Side-effects of Learning from Low Dimensional Data Embedded in an Euclidean Space*
12:00–12:05	*Concluding Remarks*