

**Foundational Research Gaps and Future Directions for Digital Twins**  
**Meeting Agenda: 12/12/22**

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**OPEN**

**December 12, 2022**

- 11:00 a.m.<sup>1</sup>    Opening Remarks**  
*Karen Willcox*
- 11:05 a.m.    George Karniadakis Presentation**
- 11:20 a.m.    Q&A with George**
- 11:45 a.m.    ADJOURN OPEN SESSION**

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<sup>1</sup> All times ET

### **Speaker Biography**

George Karniadakis received his S.M. (1984) and Ph.D. (1987) from [Massachusetts Institute of Technology](#). He was appointed Lecturer in the Department of Mechanical Engineering at MIT in 1987 and subsequently he joined the Center for Turbulence Research at [Stanford](#) / [Nasa Ames](#). He joined Princeton University as Assistant Professor in the Department of Mechanical and Aerospace Engineering and as Associate Faculty in the Program of Applied and Computational Mathematics. He was a Visiting Professor at [Caltech](#) (1993) in the [Aeronautics Department](#). He joined [Brown University](#) as Associate Professor of Applied Mathematics in the Center for Fluid Mechanics on January 1, 1994. He became a full professor on July 1, 1996. He has been a Visiting Professor and Senior Lecturer of Ocean/Mechanical Engineering at MIT since September 1, 2000. He was Visiting Professor at [Peking University](#) (Fall 2007 & 2013). He has a joint appointment with PNNL since 2013. He is a Fellow of the Society for Industrial and Applied Mathematics (SIAM, 2010-), Fellow of the American Physical Society (APS, 2004-), Fellow of the American Society of Mechanical Engineers (ASME, 2003-) and Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA, 2006-). He received the SIAM CSE/ACM prize (2021), the SIAM Ralf E Kleinman award (2015), the (inaugural) J. Tinsley Oden Medal (2013), and the CFD award (2007) by the US Association in Computational Mechanics. His h-index is 118 and he has been cited over 62,500 times ([see his google scholar citations](#)).

- Karniadakis is currently the lead PI of an [OSD/ARO/MURI on Fractional PDEs](#), and previously the lead PI of an [OSD/AFOSR MURI on Machine Learning for PDEs](#). He is also the Director of the DOE center [PhILMS on Physics-Informed Learning Machines](#) and previously he was also the Director of the DOE [Center of Mathematics for Mesoscale Modeling of Materials \(CM4\)](#).

His current research interests are on machine learning for scientific computing (Scientific Machine Learning), that is how to solve and discover new PDEs via deep learning, hence removing the tyranny of grids and using gappy data only. His broad research interests focus on stochastic multiscale mathematics and modeling of physical and biological systems. Current thrusts include probabilistic numerics, [stochastic simulation](#) (in the context of uncertainty quantification and beyond), [fractional PDEs](#), and multiscale modeling of complex systems (e.g., [the brain](#)).