1145-65-1557 **Vladimir Druskin*** (vdruskin@wpi.edu), 00 Institute Rd, WPI-Stratton Hall, Worcester, MA 01609, and **Liliana Borcea** (borcea@umich.edu), **Alexander Mamonov** and **Mikhail Zaslavsky**. *Nonlinear processing of multi-scattering data via sparse data-driven reduced order models.*

Geophysical seismic exploration, as well as radar and sonar imaging, require the solution of large scale inverse problems for hyperbolic systems of equations. In this talk, I will show how model order reduction can be used to address some intrinsic difficulties of these problems. We consider ROMs that capture properties of the large problem that are essential for imaging and that can be realized via sparse graph-Laplacian networks. The ROMs are data-driven, i.e., they learn the underlying PDE problem from the transfer function. Here I will focus on one recent applications of this approach: A direct, nonlinear imaging algorithm in strongly heterogeneous media, where the ROM is used to manipulate the data in such a way that multiply scattered waves are separated from the single scattered ones. The algorithm, known as Data-to-Born map, transforms multi-scattering data to the single-scattering one. The latter can be effectively processed by any off-shelf linear algorithm. (Received September 23, 2018)