Towards a Mathematical Theory of Seismic Tomography on Mars

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The InSight lander brought a seismometer on Mars in late 2018. One of the goals of the mission is to find the interior structure of the planet using a single seismometer to the extent possible. This talk will outline three different methods to reconstruct a radial model of the (upper) mantle for a single ideal seismometer. This is only a small step towards a more complete mathematical understanding of seismic planetary exploration, and a number of new inverse problems arise. There is a practical need of solving some very hard inverse problems on Mars, and there is a mathematical theory of seismic inverse problems. My goal is to interpolate between these two to take steps towards a mathematical theory of seismic planetary exploration.