Constructing artifact free image families in seismic inversion

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In a seismic experiment one generates acoustic waves in the earth by sources at the surface. The wavefield is recorded by an array of receivers, also located at the surface. The purpose is to use the reflections present in the data to construct an image of the subsurface. The data is usually modeled by a linearization. The medium coefficient is written as the sum of a smooth background, in which the geometrical optics approximation can be used, and a singular perturbation that causes the reflections. Given the background medium, from the data a partial, microlocal reconstruction of the medium perturbation can be obtained. To solve the nonlinear inverse problem for the background medium the redundancy in this linear inverse problem needs to be used. In this talk we establish how image families can be constructed for this purpose, when the background medium is strongly refracting, with multivalued travel times.