Extended CIPs for anisotropic wave-equation migration

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wave-equation imaging

wavefield reconstruction

imaging condition
wavefield reconstruction

source wavefield

\[ \mathcal{L} (\nu, \epsilon, \delta) [W_s (x, t)] = D_s (x_s, +t) \]

receiver wavefield

\[ \mathcal{L} (\nu, \epsilon, \delta) [W_r (x, t)] = D_r (x_r, -t) \]

Alkhalifah (2000), ..., Fowler et al. (2010)
conventional imaging condition

\[ R (x) = \sum_{\text{shots}} \sum_{t} W_s (x, t) W_r (x, t) \]

- \( x \): space coordinates
- \( t \): time coordinate
the semblance principle

redundant images describe the same structure,
if the model used for imaging is correct
the semblance principle

redundant images describe the same structure,
if the model used for imaging is correct

data-space
  experiments
    (e.g. shots)

image-space
  extensions
    (e.g. angles)
extended imaging condition

\[ R(x, \lambda, \tau) = \sum_{\text{shots}} \sum_{t} W_s(x - \lambda, t - \tau) W_r(x + \lambda, t + \tau) \]

- \( \lambda \): space-lag coordinates
- \( \tau \): time-lag coordinate
$R(x, \lambda, \tau)$
$R (x, \lambda, \tau)$
planar approximation of the reconstructed wavefields
reflector with arbitrary orientation
source wavefield – planar approximation
unshifted wavefields – form an image
$W_s (x - \lambda, t)$

$W_r (x + \lambda, t)$

space shifted wavefields – do not form image
$W_s(\mathbf{x} - \lambda, t - \tau)$

$W_r(\mathbf{x} + \lambda, t + \tau)$

*space/time shifted wavefields – form an image*
$\Delta t_1$  

$\Delta t_2$  

angle dependence – space/time shift
moveout function
superposition of shots
conclusion

fast sparse CIP construction

access model accuracy information

update models using MVA
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