Interferometry

$S$

$X_i$

$X_j$

Physical receiver

Physical source
Interferometry

$S = G(x_i, x_j, t)$

Physical receiver
Physical source
Virtual receiver
Virtual source
Interferometry

$S G(x_i, x_j, t)$

Physical receiver
Physical source
Virtual source
Physical receiver
Physical source
Virtual receiver
Marchenko

\[ G(x_i, x_s, t) \]
Marchenko

$S$

$G^s$

$x_i$

Physical receiver
Physical source
Virtual receiver
Beyond Marchenko

Physical receiver
Physical source
Virtual receiver
Virtual source

\[ S \]

\[ x_j \]

\[ x_i \]
Beyond Marchenko

\[ S \]

Physical receiver
Physical source
Virtual receiver
Virtual source

\[ G(x_i, x_j, t) \]
Beyond Marchenko

Physical receiver
Physical source
Virtual receiver
Virtual source

\[ S \]

\[ x_i \]

\[ x_j \]

\[ G^v \]
Beyond Marchenko - Obtaining virtual receivers and virtual sources in the subsurface

Satyan Singh and Roel Snieder

Center for Wave Phenomena
Inputs – Virtual Green’s function $G^v$
Inputs – Virtual Green’s function $G^v$

Physical receiver
Physical source
Virtual receiver
Virtual source

$S$

$f^S$
Inputs – Virtual Green’s function $G^v$

$G^s$
Inputs – Virtual Green’s function $G^v$
Beyond Marchenko

\[ G^V = G^S f \]
Beyond Marchenko

\[ G^v = G^s f \]

Require:

- reflection response at surface
- macro-velocity model
Virtual Green’s function – free surface
Virtual Green’s function – no free surface
Interferometry
Velocity

![Graph showing velocity over depth and position.](image-url)
Density

Graph showing the density profile with depth and distance along the x-axis.

- Density along the y-axis ranges from 0 to 1 km.
- Distance along the x-axis ranges from -1 to 1 km.

The graph illustrates how density changes with depth and distance, indicating a downward trend in density as depth increases.
Velocity
Image - correct smooth velocity
Image - wrong smooth velocity
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