GAUSSIAN BEAM MODELLING OF MIGRATION OPERATORS (C-3)

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In shot-record migration, forward wavefield extrapolation operators simulate the propagation effects of the downgoing source waves into the subsurface. On the other hand, inverse wavefield extrapolation operators eliminate the propagation effects from the received upgoing waves. Both the forward and the inverse extrapolation operators can be formulated in terms of one-way Kirchhoff integrals. For forward extrapolation the Kirchhoff integral contains the one-way source representation and forward propagating Green's functions. For inverse extrapolation the Kirchhoff integral contains the received upgoing waves (after decomposition) and backward propagating Green's functions.
For a homogeneous subsurface analytical expressions are available for the Green's functions. For an inhomogeneous subsurface these Green's functions must be computed numerically by a forward modelling scheme. Finite-element or finite-difference modelling schemes yield very accurate Green's functions but they are computationally expensive. Ray-tracing modelling schemes, on the other hand, are very efficient but not very accurate in complex media. We propose Gaussian beam modelling as an accurate and efficient tool for generating Green's functions. We will illustrate the use of Gaussian-beam-modelled Green's functions with some examples of inverse wavefield extrapolation through an inhomogeneous overburden.

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