3D i-CRS STACKING OPERATOR

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Stacking is a basic step in the seismic data processing workflow. Conventional 3D stacking techniques assume hyperbolic behavior of the moveout. Recent studies suggest that double square root (DSR) based stacking operators (2D implicit common reflection surface, Multifocusing) better fit traveltimes of reflected and diffracted events. Note that the double square root equation is fundamental to migration and naturally explains physics of reflections since it decompose the event in up- and down-going ray segments. The derivation of a DSR-based 3D stacking operator for heterogeneous media requires special auxilliary anisotropic medium to focus a wavefront. In this work we propose an implicit stacking operator and its simplified explicit version expressed in standard CRS parameters, called 3D i-CRS operator. Since so-called pragmatic parameter estimation strategy is applicable to the 3D i-CRS formula, it is easy to implement in existing CRS software. Hence the 3D i-CRS operator maintains the high computational efficiency of the conventional CRS stack. Numerical tests showed that the 3D i-CRS operator better fits traveltimes of reflection and especially diffraction events than the conventional hyperbolic CRS. Application of the method to synthetic and field data showed that the i-CRS stacking operator significantly improve stacking of diffraction events, resulting in improved stacked sections with a higher signal-to-noise ratio. The new method provides acceptable results even for 3D land data with very low fold.