The invention claimed is:

1. A method comprising:

calculating seismic source and receiver wavefields based on seismic data;

calculating characteristic source and receiver wavefields from the seismic source and receiver wavefields using characteristic solutions of a first order wave equation;

calculating propagation angles for the characteristic source and receiver wavefields;

applying a wavefield decomposition algorithm on the characteristic source and receiver wavefields to obtain corresponding directional source and receiver wavefields, wherein the wavefield decomposition algorithm decomposes wavefield amplitude of a wavefield in an angle interval centered on a propagation angle of the wavefield; and

forming angle domain common image gathers (ADCIG) by applying an image condition to the obtained directional source and receiver wavefields.

2. The method of claim 1, wherein the seismic source and receiver wavefields are calculated using a time-domain wave equation solver.

3. The method of claim 1, wherein the seismic source and receiver wavefields are calculated using a frequency-domain wave equation solver.

4. The method of claim 1, wherein the ADCIG are formed using a reverse time migration (RTM) process.

5. The method of claim 1, wherein the characteristic source and receiver wavefields are calculated for a plurality of predefined time steps with a first-order acoustic wave equation propagating model.

6. The method of claim 1, wherein the characteristic source and receiver wavefields are calculated for a plurality of predefined time steps with a second-order acoustic wave equation propagating model.

7. The method of claim 1, wherein the characteristic source wavefield has an absolute amplitude, at the propagation angle for the characteristic source wavefield, larger than an absolute amplitude at any other angles, and wherein the characteristic receiver wavefield has

an absolute amplitude, at the propagation angle for the characteristic receiver wavefield, larger than an absolute amplitude at any other angles.

8. The method of claim 1, wherein the angle interval is 1 degree, 5 degrees, or 15 degrees.

9. The method of claim 1, wherein the image condition is a cross-correlation imaging condition.

10. The method of claim 1, wherein the ADCIG are scattering angle gathers (SAG).

11. The method of claim 1, wherein the ADCIG are dip angle gathers (DAG).

12. A device, comprising:

a memory; and

a processing unit that is arranged to perform operations including:

calculating seismic source and receiver wavefields based on seismic data;

calculating characteristic source and receiver wavefields from the seismic source and receiver wavefields using characteristic solutions of a first order wave equation;

calculating propagation angles for the characteristic source and receiver wavefields;

applying a wavefield decomposition algorithm on the characteristic source and receiver wavefields to obtain corresponding directional source and receiver wavefields, wherein the wavefield decomposition algorithm decomposes wavefield amplitude of a wavefield in an angle interval centered on a propagation angle of the wavefield; and

forming angle domain common image gathers (ADCIG) by applying an image condition to the obtained directional source and receiver wavefields.

13. The device of claim 12, wherein the seismic source and receiver wavefields are calculated using a time-domain wave equation solver.

14. The device of claim 12, wherein the seismic source and receiver wavefields are calculated using a frequency-domain wave equation solver.

15. The device of claim 12, wherein the ADCIG are formed using a reverse time migration (RTM) process.

16. The device of claim 12, wherein the characteristic source and receiver wavefields are calculated for a plurality of predefined time steps with a first-order acoustic wave equation propagating model.

17. The device of claim 12, wherein the characteristic source and receiver wavefields are calculated for a plurality of predefined time steps with a second-order acoustic wave equation propagating model.

18. The device of claim 12, wherein the characteristic source wavefield has an absolute amplitude, at the propagation angle for the characteristic source wavefield, larger than an absolute amplitude at any other angles, and wherein the characteristic receiver wavefield has an absolute amplitude, at the propagation angle for the characteristic receiver wavefield, larger than an absolute amplitude at any other angles.

19. The device of claim 12, wherein the angle interval is 1 degree, 5 degrees, or 15 degrees.

20. A non-transitory computer-readable medium storing instructions executable by a computer system to perform operations comprising:

calculating seismic source and receiver wavefields based on seismic data;

calculating characteristic source and receiver wavefields from the seismic source and receiver wavefields using characteristic solutions of a first order wave equation;

calculating propagation angles for the characteristic source and receiver wavefields;

applying a wavefield decomposition algorithm on the characteristic source and receiver wavefields to obtain corresponding directional source and receiver wavefields, wherein the wavefield decomposition algorithm decomposes wavefield amplitude of a wavefield in an angle interval centered on a propagation angle of the wavefield; and

forming angle domain common image gathers (ADCIG) by applying an image condition to the obtained directional source and receiver wavefields.