Figure A.1: sensitivity of model parameters for a single layer over a half space. Influence of the thickness of sediments (standard deviation = 5% of the absolute value)
**Figure A.2:** sensitivity of model parameters for a single layer over a half space. Influence of the density of sediments (standard deviation = 5% of the absolute value). The average density for the sediments is 2.
Figure A.3: sensitivity of model parameters for a single layer over a half space. Influence of the Vp of sediments (standard deviation = 5% of the absolute value).
Figure A.4: sensitivity of model parameters for a single layer over a half space. Influence of the Vs of sediments (standard deviation = 5% of the absolute value). The Poisson’s Ratio is not kept constant.
Figure A.5: sensitivity of model parameters for a single layer over a half space. Influence of the Vs of sediments (standard deviation = 5% of the absolute value). The Poisson's Ratio is kept constant
Figure A.6: sensitivity of model parameters for a single layer over a half space. Influence of the density of the half-space (standard deviation = 5% of the absolute value). The average density for the half-space is 2.6.
Figure A.7: sensitivity of model parameters for a single layer over a half space. Influence of the Vp of the half-space (standard deviation = 5% of the absolute value).
Figure A.8: sensitivity of model parameters for a single layer over a half space. Influence of the Vs of the half-space (standard deviation = 5% of the absolute value). The Poisson's Ratio is not kept constant.
Figure A.9: sensitivity of model parameters for a single layer over a half space. Influence of the Vs of the half-space (standard deviation = 5% of the absolute value). The Poisson’s Ratio is kept constant.
Figure A.10: sensitivity of model parameters for 2 layers over a half space. Influence of the thickness of 1st layer (standard deviation = 5% of the absolute value)
Figure A.11: sensitivity of model parameters for 2 layers over a half space. Influence of the density of 1\textsuperscript{st} layer (standard deviation = 5\% of the absolute value). The average density for the 1\textsuperscript{st} layer is 2.
Figure A.12: sensitivity of model parameters for 2 layers over a half space. Influence of the Vp of 1st layer (standard deviation = 5% of the absolute value).
Figure A.13: sensitivity of model parameters for 2 layers over a half space. Influence of the Vs of the 1st layer (standard deviation = 5% of the absolute value). The Poisson's Ratio is not kept constant.
Figure A.14: sensitivity of model parameters for 2 layers over a half space. Influence of the Vs of the 1st layer (standard deviation = 5% of the absolute value). The Poisson's Ratio is kept constant.
Figure A.15: sensitivity of model parameters for 2 layers over a half space. Influence of the thickness of 2nd layer (standard deviation = 5% of the absolute value)
Figure A.16: sensitivity of model parameters for 2 layers over a half space. Influence of the density of 2nd layer (standard deviation = 5% of the absolute value). The average density for the 2nd layer is 2.2.
Figure A.17: sensitivity of model parameters for 2 layers over a half space. Influence of the Vp of 2nd layer (standard deviation = 5% of the absolute value).
Figure A.18: sensitivity of model parameters for 2 layers over a half space. Influence of the Vs of the 2\textsuperscript{nd} layer (standard deviation = 5\% of the absolute value). The Poisson's Ratio is not kept constant.
Figure A.19: sensitivity of model parameters for 2 layers over a half space. Influence of the Vs of the 2nd layer (standard deviation = 5% of the absolute value). The Poisson's Ratio is kept constant.
Figure A.20: sensitivity of model parameters for 2 layers over a half space. Influence of the density of half-space (standard deviation = 5% of the absolute value). The average density for the half-space is 2.6.
Figure A.21: Sensitivity of model parameters for 2 layers over a half space. Influence of the Vp of half-space (standard deviation = 5% of the absolute value).
Figure A.22: sensitivity of model parameters for 2 layers over a half space. Influence of the Vs of the half-space (standard deviation = 5% of the absolute value). The Poisson's Ratio is not kept constant.
Figure A.23: sensitivity of model parameters for 2 layers over a half space. Influence of the Vs of the half-space (standard deviation = 5% of the absolute value). The Poisson's Ratio is kept constant.
Figure A.24: Sensitivity of model parameters for a single layer over a half space. Influence of the Vp of sediments (standard deviation = 5% of the absolute value). The average Vp is 1500 m/s, Poisson's ratio is close to 0.5. Vp has no influence neither on dispersion nor on ellipticity (see figure A.3).
Figure B.1: a single layer over a half-space, synthetic data. The density for superficial layer is 2 and for half-space is 2.6. The fundamental and the 1\textsuperscript{st} higher are plotted.
**Figure B.2:** A single layer over a half-space, synthetic data. Inversion using only the fundamental mode at frequencies over the frequency of the peak ellipticity. The black line represents the perfect original model depicted on figure B.1.
Figure B.3: a single layer over a half-space, synthetic data. Inversion using only the fundamental mode at frequencies over the frequency of the peak ellipticity. Projections of the 5-dimension parameter space on 2D parameter planes. Each point represents a model, blue points are models having the best misfit.
Figure B.4: a single layer over a half-space, synthetic data. Inversion using only the fundamental mode at frequencies over the frequency of the peak ellipticity. Value of the best misfit versus the number of generated models. Three inversions with different seeds were performed, leading to slightly distinct results.
Figure B.5: a single layer over a half-space, synthetic data. Inversion using only the fundamental mode at frequencies over the frequency of the peak ellipticity. Model generated by the inversion characterized by the blue line on figure B.4. The fit is not as good as for other 2 inversion processes, trapped in a local minimum.
Figure B.6: a single layer over a half-space, synthetic data. Inversion using only the 1\textsuperscript{st} higher mode at frequencies over the frequency of the peak ellipticity. The black line represent the perfect original model depicted at figure B.1. Black dots are the 1\textsuperscript{st} higher mode, the fundamental mode is also calculated and plotted.
**Figure B.7:** A single layer over a half-space, synthetic data. Inversion using both modes at frequencies over the frequency of the peak ellipticity. The black line represents the perfect original model depicted at figure B.1.
Figure B.8: a single layer with high Vp over a half-space, synthetic data. The density for superficial layer is 2 and for half-space is 2.6. The fundamental and the 1st higher are plotted.
Figure B.9: a single layer over a half-space, synthetic data. Inversion using only the fundamental mode at frequencies over the frequency of the peak ellipticity. The black line represents the perfect original model depicted at figure B.8.
Figure B.10: 2 layers over a half-space, synthetic data. The density for superficial layers are 2 and 2.1 and for half-space is 2.6. The fundamental and the 1\textsuperscript{st} higher are plotted.
Figure B.11: 2 layers over a half-space, synthetic data. Inversion using only the fundamental mode at frequencies over the frequency of the peak ellipticity. The black line represent the perfect original model depicted at figure B.10.
**Figure B.12:** 2 layers over a half-space, synthetic data. Inversion using only the fundamental mode at frequencies over the frequency of the peak ellipticity. The black line represents the perfect original model depicted at figure B.10. Use the depth parametrization rather than the thickness used so far.
Figure B.13: 2 layers over a half-space, synthetic data. Inversion using only the fundamental mode at frequencies over the frequency of the peak ellipticity. The black line represents the perfect original model depicted at figure B.10. Use the depth parametrization and basement's depth constraint.
Figure B.14: 2 layers over a half-space, synthetic data. Inversion using only the 1st higher mode at frequencies over the frequency of the peak ellipticity. The black line represent the perfect original model depicted at figure B.10. Use the depth parametrization without basement's depth constraint.
Figure B.15: 2 layers over a half-space, synthetic data. Inversion using both modes at frequencies over the frequency of the peak ellipticity. The black line represent the perfect original model depicted at figure B.10. Use the depth parametrization without basement's depth constraint.
Figure B.16: 2 layers over a half-space with a non uniform velocity, synthetic data. The density for superficial layers are 2 and 2.1 and for half-space is 2.6. The fundamental and the 1st higher are plotted. The number of sub-layers is 41.
Figure B.17: 2 layers over a half-space with a non-uniform velocity, synthetic data. The density for superficial layers are 2 and 2.1 and for half-space is 2.6. The fundamental and the 1st higher are plotted. The number of sub-layers is 601. Ellipticity and dispersion are changed compared to figure B.16.
Figure B.18: 2 layers over a half-space with a non-uniform velocity, synthetic data. Inversion of the fundamental mode at frequencies over the frequency of the peak ellipticity. The black line represents the perfect original model depicted at figure B.16. Use the depth parametrization with basement's depth constraint.
Figure B.19: 2 layers over a half-space with a non uniform velocity, synthetic data. Inversion of the fundamental mode at frequencies over the frequency of the peak ellipticity. The black line represent the perfect original model depicted at figure B.17. Use the depth parametrization with basement's depth constraint.
Figure B.20: 2 layers over a half-space with velocity inversion, synthetic data. The density for first layers is 3 and 2 for the others. The fundamental and the 1st higher are plotted.
Figure B.21: 2 layers over a half-space with velocity inversion, synthetic data. Inversion of the fundamental mode at frequencies over the frequency of the peak ellipticity. The black line represent the perfect original model depicted at figure B.20.