



Multi-Mode Multi-Offset Phase Analysis of surface wave data (MMMOPA)

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The Multi-Offset Phase Analysis (MOPA) is a quite recent technique for the analysis of seismic surface wave dispersion. Despite its robustness MOPA has a limitation: it is based on the assumption of one predominant mode, usually the fundamental mode, in the propagation. The new technique presented here, called Multi-Mode Multi-Offset Phase Analysis (MMMOPA), can be considered as an extension of the MOPA technique to the two-modes case and it is valid for laterally homogeneous media only. The method extracts information both from the amplitude and the phase of the signal which, in the specific case of interference between two different modes, present a periodic behaviour as a function of offset. The implemented automatic algorithm (1) identifies the spatial period from the oscillating amplitude, (2) extracts amplitude maxima and minima, (3) derives the local wavenumber via linear regression and (4) analytically computes the final dispersion curve. When experimental replicates are available, phase and amplitude variances are propagated through the different steps of the analysis to compute uncertainties on the final model.

The algorithm has been successfully tested both on synthetic and real datasets. It can be considered as a first simplified prototype, which could be improved to take into account lateral velocity variations and to provide an estimation of the damping ratio.