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On the determination of space-time slip distribution with a regularized constraints inversion algorithm.

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The description of the seismic source from a set of their effects recorded at the surface constitutes a scientific problem, with solution reached through the methodological proposal of the Discrete Inverse Theory. In the case of finite sources it consists to determinate the evolution of vector slip field over the fault area: a 3D solution (time and two slip components to the points on the fault). The resolution of this problem, based on the discretization of the representation theorem, [1] [2], has been tried since to about 40 years. Currently there are several non-linear inversion formulations that produces numerically reasonable solutions and physically consistent.
In this work we suggest an inversion method based on dual simplex algorithm, for reconstruct the kinematics rupture image of large earthquakes through space-time seismic slip distribution on finite faults planes. In its general setting, the method produces results from a near field strong ground motion waveforms, but can also be used with teleseismic waveforms as well as with geodesic data (static case).
The solution of an auxiliary linear programming problem is an essential part of the developed method.
To test this algorithm and examine its stability, non-uniqueness and robustness we applied it to a set of synthetic data obtained from the solution of a forward problem considering a particular slip distribution and near field Green functions, calculated by a finite differences method with a 3D structure model. The likeness between the inversion and the known solutions supports the credibility to use this method with data of real earthquakes.

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