HIGH-PERFORMANCE PARALLEL SOLVER FOR INTEGRAL EQUATIONS OF ELECTROMAGNETICS BASED ON GALERKIN METHOD

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A new parallel solver for the volumetric integral equations (IE) of electrodynamics is presented. The solver is based on the Galerkin method which ensures the convergent numerical solution. The main features include:

1. the reduction of the memory usage in 8 times, compared to analogous IE based algorithms, without additional restriction on the background media;
2. accurate and stable method to compute matrix coefficients corresponding to the IE;
3. high degree of parallelism.

The solver's computational efficiency is shown on a problem of magnetotelluric sounding of the high conductivity contrast media. A good agreement with the results obtained with the second order finite element method by [1] is demonstrated (Fig 1). Due to effective approach to parallelization and distributed data storage the program exhibits perfect scalability on different hardware platforms.

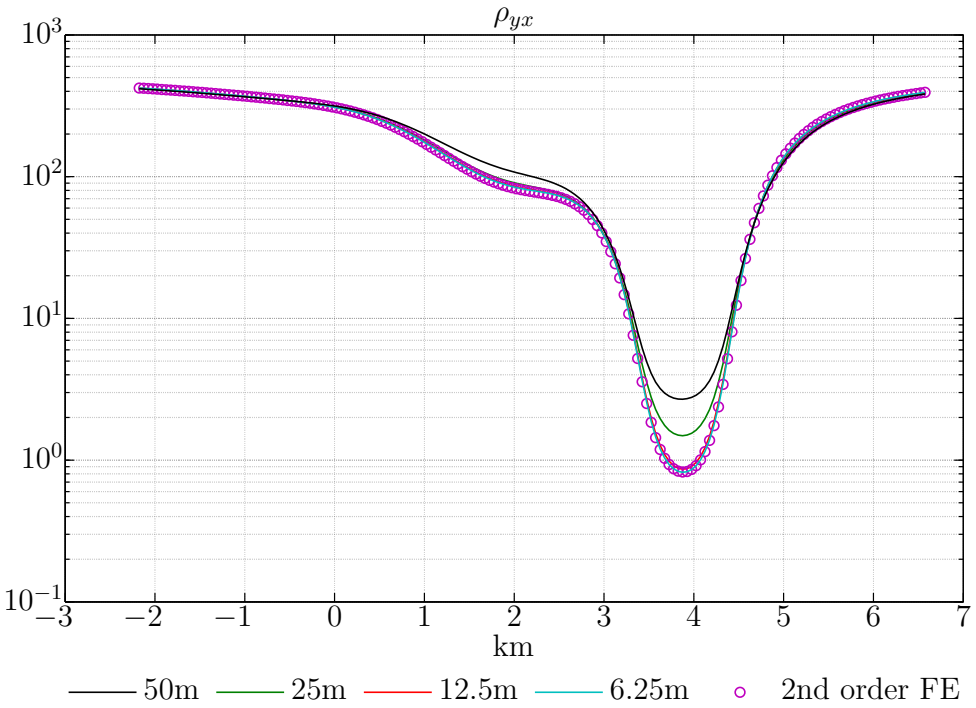

Figure 1. Apparent resistivity ρ_{yx} at period 1 s along profile $y = 1$ km for different subdomain sizes, for COMMEMI3D-3 model from [2].

References

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