

Reduced Basis Method for Time-Dependent Maxwell's Equations

IMBO SIM¹

¹Mathematics Institute of Computational Science and Engineering, EPFL Imbo.Sim@epfl.ch

1 Abstract

We propose a new method for fast and reliable evaluations of outputs for time-dependent parameterized electromagnetic problems. The reduced basis (RB) method allows us very fast online calculation, which is based on Galerkin projection onto a low-dimensional smooth parametric manifold. This results in a significant reduction of the problem size. The reduced basis method for Maxwell's problems has been applied to time-harmonic cases ([1], [2]). Here we investigate the reduced basis method for geometrically and physically parametrized time-dependent electromagnetic scattering problems in unbounded domains. The lower bound for the inf-sup stability constants is constructed by successive constraint method (SCM). The incorporation of the global inf-sup bound into reduced basis justifies a posteriori error estimators both the Offline and Online stages.

References

- [1] Y. Chen, J.S. Hesthaven, Y. Maday, and J. Rodriguez: *Certified Reduced Basis Methods and Output Bounds for the Harmonic Maxwell's Equations*, SIAM J. Sci. Comput. Volume 32, Issue 2, pp. 970-996 (2010).
- [2] J. Pomplun and F. Schmidt: *Accelerated A Posteriori Error Estimation for the Reduced Basis Method with Application to 3D Electromagnetic Scattering Problems*, SIAM J. Sci. Comput. Volume 32, Issue 2, pp. 498-520 (2010).