A 3-D forward solver using a staggered-grid integral formulation

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A staggered grid numerical method (SGIF) is presented for computing the electromagnetic induction response of an arbitrary heterogeneous conducting sphere by external currect exciatation. This method is appropriate as the forward solution for the problem of determining the electrical conductivity of the Earth's deep interior. After comparison between an analytical and semi-analytical solutions, we found that the present method demonstrated excellent asymptotic convergence to the (semi-) analytical solutions as mesh devision was refined. In order to enhance the speed and the accuracy of the solution, we improved the iterative method to invert the ill-conditioned huge matrix equation system.