“格物探知”系列之巡天·探地·潜海

资源与地球科学学院

地球物理学大讲坛

题　目： 外推多重网格法加速棱单元电磁法正演

主讲人： 潘克家　中南大学教授

时　间： 2023 年 10 月 27 日（周五）上午 9：00

地　点： 资源楼 B401

报告人简介：

潘克家，中南大学教授，数学与统计学院副院长，博士生导师，湖南省芙蓉青年学者，湖南省杰青。长期从事电法及电磁法正反演等方面的研究工作，科学出版社出版专著 2 部，在 SIAM J Sci Comput、J Comput Phys、Comput Methods Appl Mech Engrg、Geophys Res Lett、Surv Geophys、Geophys J Int、Geophysics 等权威期刊发表 SCI 论文 90 多篇，H 指数为 21。主持 4 项国家自然科学基金项目，国防科工局国防基础科研核科学挑战专题项目，湖南省自然科学杰出青年基金等项目多项；参与国家自然科学基金原创探索计划项目、国际地区合作与交流项目、国家“863”计划重点项目等多项。2010 年入选上海市优秀博士学位论文，2016 年荣获中南大学蔡田媗珠奖励金优秀教师奖、当选湖南省普通高校青年骨干教师，2020 年荣获中南大学茅以升科研奖励金。

报告摘要：

A new extrapolation cascadic multigird (EXCMG) method is developed to solve large linear systems encountered in geophysical EM modelling with arbitary anisotropic conductivity. By treating edge unknowns as defined on the midpoints of edges, we design a new prolongation operator for 3-D edge element discretizations on rectilinear grids, which can construct a good approximation to the FE solution on the refined grid. The good initial guess greatly reduces the numbers of the iterations required by the preconditioned BiCGStab smoother. Numerical experiments are carried out to validate the accuracy and efficiency of the proposed method, including problems with exact solutions, magnetotelluric modelling, and controlled-source EM modelling (CSEM). The proposed EXCMG method is more efficient than traditional Krylov-subspace iterative methods, and the auxiliary-space Maxwell solver (AMS), especially for large-scale problems where the number of unknowns exceeds 10 million.