

THE UNIVERSITY



OF HONG KONG

*Institute of Mathematical Research
Department of Mathematics*

Numerical Analysis Seminar

Numerical methods for a nonlinear Helmholtz equation

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Abstract

In this talk, we discuss numerical methods for the nonlinear Helmholtz equation, which aims to model time-harmonic wave propagation in nonlinear media. We first focus on the case of constant coefficients and show a priori error estimates for finite element methods of arbitrary polynomial order. Further, we discuss two different iteration schemes. In the second part, we consider the case of multiscale coefficients, where such direct numerical schemes have a high computational complexity. Therefore, we will discuss multiscale methods as a remedy, where the approximation spaces are problem adapted. A special focus lies on how to tackle the nonlinearity in the approach. We present rigorous a priori error analysis as well as illustrating numerical examples.

Date: Feb. 21, 2024 (Wednesday)

Time: 4:00 – 5:00pm

Venue: ZOOM: <https://hku.zoom.us/j/>

Meeting ID: 913 6532 3891

Password: 310656

All are welcome