FUDAN UNIVERSITY

# Applied Math Ph.D. Seminar

## 2D EVP: theory and algorithms

**Speaker:** Tianyi Lu (Fudan University)

**Time:** 2021-04-01, 16:10 to 17:00

**Location:** Rm 1801, Guanghua East Tower

**Advisor:** Yangfeng Su (Fudan University)

**Abstract:** The 2D eigenvalue problem (2D EVP) is a class of the 2-parameter eigenvalue problems and dates back to the work of Blum and Chang in 1970s. 2D EVP seeks real scalars $\lambda, \mu$, and a corresponding vector $x$ satisfying the following equations

$$Ax = \lambda x + \mu Cx, \tag{1}$$
$$x^H Cx = 0, \tag{2}$$
$$x^H x = 1, \tag{3}$$

where $A$ and $C$ are Hermitian and $C$ is indefinite. We will briefly introduce its applications and fundamental theory, including its relation to eigenvalue optimization, variational characterization and number of solutions. We will introduce a 2D Rayleigh Quotient method to solve it, which is very suitable for large scale problems. Examples are given to demonstrate the efficiency of the algorithm compared to other eigenvalue optimization methods. Generalizations, e.g., to kDEVP, will also be covered.