



復旦大學  
FUDAN UNIVERSITY

# Applied Math Ph.D. Seminar

## Color Image Restoration via Saturation-Value Regularization: Local, Nonlocal and Adaptive Models

**Speaker:** Yakun Li (Tongji University)

**Time:** 2026-06-18, 16:10 to 17:00

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

**Advisor:** Wei Wang (Tongji University)

**Abstract:** Total Variation methods are important mathematical tools in image processing. The fundamental idea is to transform problems such as denoising, deblurring, smoothing and image restoration into optimization problems by constructing an energy functional that includes data fidelity and regularisation terms. This report focuses on the application of the Saturation-Value regularisation (SVTV) and its generalised models in color image restoration. We first review the original SVTV model, explaining how saturation and value information in the HSV colour space is utilised to characterise color edges and structures, thereby addressing the issues of insufficient color coupling and color artefacts found in traditional RGB-TV models. Subsequently, we discuss the non-local SVTV models based on saturation-value similarity, which combine the color description capabilities of SVTV with the self-similar structure of non-local patches to better preserve image texture and detail. Building on this, we further introduce the Huber-type adaptive non-local SVTV model, and a GFB based saturation-value framework.