



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON PDE

**Nonlocal approximation of minimal surfaces:
optimal estimates from stability**

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ETH

Abstract

Minimal surfaces in closed 3-manifolds are classically constructed via the Almgren-Pitts approach. The Allen-Cahn approximation has proved to be a powerful alternative, and Chodosh and Mantoulidis (in *Ann. Math.* 2020) used it to give a new proof of Yau's conjecture for generic metrics and establish the multiplicity one conjecture. In two recent papers --- with Chan, Dipierro and Valdinoci, and with Caselli and Florit--- we set the ground for a new approximation based on nonlocal minimal surfaces. In the first paper, we prove that stable s -minimal surfaces in the unit ball of \mathbb{R}^3 satisfy curvature estimates that are robust as s approaches 1 (i.e. as the energy approaches that of classical minimal surfaces). Moreover, we obtain optimal sheet separation estimates and show that critical interactions are encoded by nontrivial solutions to a (local) "Toda type" system. As a nontrivial application, we establish that hyperplanes are the only stable s -minimal hypersurfaces in \mathbb{R}^4 , for s sufficiently close to 1. In the second paper, we establish the existence of infinitely many nonlocal minimal surfaces in every closed manifold (i.e., a version of Yau's conjecture).

Date: 28 September 2023 (Thursday)

Time: 4:00pm

Zoom Meeting: <https://hkust.zoom.us/j/94284877910> (Passcode: 675302)

All are Welcome!