

STAVROS NIARCHOS FOUNDATION – FORTH SEMINAR SERIES

Tuesday 29 January 2019

16:00 – 17:00

A. Payatakes Seminar Room

"On the Converse Problem for the Two-Component Gross-Pitaevskii System with a Large Coupling"

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Abstract

Strongly coupled elliptic systems arise in the study of repulsive two-component Bose-Einstein condensates. In the strong competition (repulsion) limit, solutions that remain uniformly bounded are known to converge uniformly to a limiting profile whose components have disjoint supports wherein they satisfy limiting elliptic problems. Actually, their supports are separated by interfaces, across which the limiting profiles are merely Lipschitz continuous. In fact, the difference of these segregated components is a classical, sign-changing solution to a limiting scalar PDE. We will present the main known results and the state of the art, paying special emphasis on the blow-up limit problem near the interface and its linearization. We will then focus in the converse direction, that is whether solutions of the aforementioned limit scalar PDE problem can give rise to corresponding solutions of the coupled system for large values of the coupling parameter. Under natural linear nondegeneracy assumptions on a solution of the limit problem, we show that this is indeed the case in the radial setting. Our approach is perturbative, based on making rigorous formal matched asymptotics via a linearization procedure. Moreover, we provide fine estimates for the convergence to the corresponding solutions of the limit problems as the coupling parameter tends to infinity. This talk is based on a joint work with J-B. Casteras (Free University of Brussels).