



ΠΑΝΕΠΙΣΤΗΜΙΟ ΙΩΑΝΝΙΝΩΝ

ΤΜΗΜΑ ΜΑΘΗΜΑΤΙΚΩΝ



Εβδομαδιαίο Σεμινάριο

**DOMAIN WALLS IN COUPLED GROSS-PITAEVSKII SYSTEMS:
THE WEAK AND STRONG SEPARATION LIMITS**

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Domain walls are heteroclinic connections for coupled two-component systems with variational structure and of competitive nature, the first component of which connects zero to a nonzero equilibrium while the second one connects, respectively, a nonzero to the zero equilibrium. Domain walls occur in many physical experiments such as in the convection of patterns, nonlinear optics, and two mixed Bose-Einstein condensates.

Firstly, we will briefly review some known results for the existence of domain walls that minimize the associated energy.

Secondly, we will show that such domain walls are unique modulo translations using a continuation argument with respect to the coupling parameter.

Thirdly, we will study the behaviour of these domain walls in the so called weak separation limit, when the coupling (competition) parameter tends to its lowest value, using geometric singular perturbation theory. In fact, exactly at the lowest value of the

coupling we have very recently shown a Liouville type theorem for the corresponding PDE problem (in any dimension).

Lastly, we will study the irregular limiting behaviour of the domain walls in the strong competition regime by making rigorous the formal matched asymptotic analysis via a gluing argument and a variational Lyapunov-Schmidt method.

If time permits, we will also present ongoing work in the strong competition limit of more general systems in bounded domains using such a perturbation viewpoint.

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Αίθουσα 201α Τμήματος Μαθηματικών

Μετά την ομιλία ακολουθεί καφές και συζήτηση στο εντευκτήριο του Τμήματος