



2009 - 2010



**MATHEMATICS COLLOQUIUM SERIES**  
**UNIVERSITY OF CENTRAL FLORIDA**

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Spatiotemporal two-dimensional solitons in the complex  
Ginzburg-Landau equation

Bérard Florent \*  
and  
Stefan C. Mancas†

**Abstract**

We introduce spatiotemporal solitons of the two-dimensional complex Ginzburg-Landau equation (2D CCQGLE) with cubic and quintic nonlinearities in which asymmetry between space-time variables is included. A rich variety of evolution behaviors, which include pulsating, creeping, exploding and spinning dissipative soliton dynamics is revealed. The 2D CCQGLE is solved by spectral methods, i.e., a Fourier spatial discretization and an explicit scheme for time differencing. For the domains of the parameters that we explored, we have also found stable coherent structures in the form of spinning solitons. These exist for a certain region of parameters, as a result of a competition between focusing nonlinearities and spreading while propagating through medium. Varying the system's parameters, and using Gaussian and ring initial conditions, the simulations revealed more distinct 2D solitons in the form of pulsating, vortex (spinning), and for the first time creeping and exploding solitons which possess very distinct properties.

**DATE:** Thursday, October 1, 2009  
**TIME:** 11:00am – 12:00pm  
**PLACE:** MAP 318

**Refreshments will be served.**