1107-35-63 **Gunduz Caginalp*** (caginalp@pitt.edu), Math Dept, Univ of Pittsburgh, Pittsburgh, PA 15260. *Scaling and renormalization methods for higher order differential equations.*

Higher order (than two) equations arise in applications such as crsytal growth and phase field models. Methodology for equations higher than second order are scarce. This talk will focus on adapting methodology of statistical mechanics and quantum field theory to approximate solutions to an arbitrary order differential equation boundary value problem by a second order equation. In particular, we study equations involving the derivative of a double-well potential such as u-u^3 or -u+$2u^3$. Using momentum (Fourier) space variables we average over short length scales and demonstrate that the higher order derivatives can be neglected within the first cumulant approximation, once length is properly rescaled, yielding an approximation to solutions of the higher order equation from the second order. The results are confirmed using numerical computations. Additional numerics confirm that the main role of the higher order derivatives is in rescaling the length. Most of the talk will be on work in collaboration with Dr. Emre Esenturk. (Received December 21, 2014)