
TADELE MENGESHA, University of Tennessee Knoxville

Calderon-Zygmund theory for the spectral fractional elliptic equations

Global Calderon-Zygmund type estimates are obtained for solutions to fractional elliptic problems over smooth domains. Our approach is based on the “extension problem” where the fractional elliptic operator is realized as a Dirichlet-to-Neumann map to a degenerate elliptic PDE in one more dimension. This allows the possibility of deriving estimates for solutions to the fractional elliptic equations from that of degenerate elliptic equations. We will confirm this first by obtaining weighted estimates for the gradient of solutions to a class of linear degenerate/singular elliptic problems over a bounded, possibly non-smooth, domain. The class consists of those with coefficient matrix that symmetric, nonnegative definite, and both its smallest and largest eigenvalues are proportion to a particular weight that belongs to a Muckenhoupt class. The weighted estimates are obtained under a smallness condition on the mean oscillation of the coefficients with a weight. This is a joint work with T. Phan.