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Qiang Du* (qdu@math.psu.edu), Department of Mathematics, Pennsylvania State University, University Park, PA 16802. *Nonlocal calculus and its applications to nonlocal models.*

In this talk, we discuss various features of a nonlocal vector and exterior calculus which is motivated from the mathematical studies of nonlocal peridynamic models. We discuss how they can be applied to formulate and analyze volume constrained problems. We also consider the analysis of numerical discretizations within this nonlocal framework. The talk is based on joint works with various collaborators including M. Gunzburger, R. Lehoucq, L. Ju, L. Tian, T. Mengesha, X. Zhao, K. Zhou, T. Le, Z. Huang and X. Tian. (Received September 21, 2012)