1092-35-339 **Gregory C Verchota***, Dept. Mathematics, Syracuse University, Syracuse, NY 13244.
Constructing coercive bilinear forms for Neumann problems. Preliminary report.

Constant coefficient coercive integro-differential bilinear (sesquilinear) forms over the full Sobolev space $W^{1,2}(\Omega)$ are known to not generally exist in bounded convex domains Ω of $\mathbb{R}^n$ for a class of elliptic constant coefficient operators including 2nd order strongly elliptic systems. Application of the classical Lax-Milgram theorem in order to identify Neumann boundary operators and prove existence of corresponding solutions is therefore not possible with constant coefficient forms. Nor is solvability by way of Rellich identities in the standard way for the more recent strong pointwise theory in Lipschitz domains. Failing also then is the method of layer potentials on Lipschitz boundaries. Preliminary investigations seem to show that classical nonconstant coefficient forms will also not suffice. Maz'ya and Verbitsky have characterized bounded forms with distributional coefficients for general 2nd order scalar operators over $\mathbb{R}^n$, showing that such coefficients must satisfy certain BMO and trace inequality conditions. We discuss these and their extension to bounded domains, association to specific operators and the coercivenss problem. (Received August 13, 2013)