1052-35-239 **Gregory Verchota*** (gverchot@syr.edu), Department of Mathematics, Syracuse University, 215 Carnegie Hall, Syracuse, NY 13244. *Linear elliptic operators requiring indefinite terms in the quadratic Dirichlet form in order for a full coercive estimate to hold.*

Certain 4th order linear real constant coefficient elliptic differential operators $L = \sum_{|\alpha|=|\beta|=2} a_{\alpha\beta}\partial^{\alpha+\beta}$ are shown to satisfy a coercive integro–differential estimate

$$c \sum_{|\alpha|\le 2} \int_\Omega |\partial^\alpha u|^2 dX \le \sum_{|\alpha|=|\beta|=2} \int_\Omega a_{\alpha\beta}\partial^\alpha u \, \overline{\partial^\beta u} dX + c_0 \int_\Omega |u|^2 dX, \quad (c > 0)$$

over the full Sobolev space $W^{2,2}(\Omega)$ only when the right side contains quadratic terms that are indefinite, in fact negative definite on an infinite dimensional subspace of $W^{2,2}(\Omega)$. These terms are shown to be necessary even when L, in addition, can be written as a sum of squares of homogeneous 2nd order operators $\sum p_j^2(\partial)$, so that L also has formally positive forms $\sum_j \int_\Omega |p_j(\partial)u|^2 dX$. In these cases all formally positive forms are shown to be noncoercive over $W^{2,2}(\Omega)$. (Received August 28, 2009)