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David George Caraballo* (dgc3@georgetown.edu), Department of Mathematics and Statistics, 3rd floor, St. Mary's Hall, Georgetown University, Washington, DC 20057-1233. *Convexity and geometric measure theory.*

In this talk, I will present my recent work establishing strong, new connections between geometric measure theory and results concerning convexity theory which have found wide application in fields such as functional analysis, economics, optimization, and control theory.

One of the most important and well-known properties of convex sets is the fact that a closed subset K of R^n with non-empty interior is convex if and only if it has a supporting hyperplane through each point of its topological boundary.

I have refined this result, showing that such a set K is convex if and only if it has a supporting hyperplane through each point of its reduced boundary, which may be much smaller than the topological boundary. This is surprising as it is not at all clear why the reduced boundary from geometric measure theory should contain all the convexity information about a closed subset of R^n with non-empty interior.

I similarly refined a standard separation theorem, as well as a representation theorem for convex sets, and extended each result to other notions of boundary from the literature, deducing the corresponding classical results from convex analysis as special cases. (Received September 13, 2010)