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Gabor Pataki* (gabor@unc.edu), Dept of Statistics and Operations Research, UNC Chapel Hill, CB #3260, Chapel Hill, NC 27599-3260. *On the closedness of the linear image of a closed convex cone.*

One of the most fundamental questions in convex analysis is also the simplest:

given a closed convex cone, and a linear mapping, under what conditions is the image of the cone closed?

In the literature several simple *sufficient* conditions are known, but the only known *exact* characterizations are much more involved. We give a surprisingly simple condition which

1. is necessary for all cones
2. unifies and generalizes several classic, seemingly disparate conditions, such as an "intersecting in the interior" type condition, and the polyhedrality of the cone,
3. is necessary and sufficient for a large class that we call nice cones.

Nice cones subsume most cones that occur in optimization, such as the semidefinite cone, cones arising from p-norms, and of course polyhedral cones. The results are applicable in the duality theory of conic systems, and potentially in other areas as well. (Received February 15, 2007)