K-Quasiconvexity Reduces to Quasiconvexity

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Abstract: The relation between quasiconvexity and k-quasiconvexity, $k \geq 2$, is investigated. It is shown that every smooth strictly k-quasiconvex integrand with p-growth at infinity, $p > 1$, is the restriction to k-th order symmetric tensors of a quasiconvex function with the same growth. When the smoothness condition is dropped, it is possible to prove an approximation result. As a consequence, lower semicontinuity results for k-th order variational problems are deduced as corollaries of well-known first order theorems. This generalizes a previous work by Dal Maso, Fonseca, Leoni and Morini, in which the case $k = 2$ was treated.