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An overview of Euler class theory.

The Euler class program was outlined, by M. V. Nori around 1990, as a possible obstruction theory for projective modules of top rank to split off a free direct summand. The program has its genesis in Topology and has been the most important development in the subject of projective modules in its recent history. We give an overview of this theory with an emphasis on the following question:

Question: Let $X = \text{Spec}(A)$ be a smooth affine variety of dimension $n \geq 2$ over \mathbb{R} (the field of real numbers) and P a projective A -module of rank n . Under what further restrictions, does vanishing of the top Chern class

$$C^n(P) = 0 \implies P \simeq A \oplus Q?$$

We answer this question completely. We show that, in some cases, additional topological obstruction does exist. (Received August 02, 2006)