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On cohomology operations and characteristic classes

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In this paper exterior products are used to define cohomology operations and characteristic classes with values in Grothendieck groups of fields, schemes and topological spaces. We also prove elementary properties of the characteristic classes. We calculate some examples and show that the characteristic classes of connections with values in Grothendieck groups of fields refine characteristic classes of connections with values in Chevalley-Hochschild cohomology. We also construct a ramification class in the Grothendieck group of an infinite dimensional Lie algebra associated to an arbitrary finite morphism of projective curves.