Differential p-forms and q-vector fields with constant coefficients

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Abstract. Differential p-forms and q-vector fields with constant coefficients are studied. Differential p-forms of degrees $p = 1, 2, n-1, n$ with constant coefficients on a smooth n-dimensional manifold M are characterized. In the contravariant case, the obstruction for a q-vector field V_q to have constant coefficients is proved to be the Schouten-Nijenhuis bracket of V_q with itself. The q-vector fields with constant coefficients of degrees $q = 1, 2, n-1, n$ are also characterized. The notions of differential p-forms and q-vector fields with conformal constant coefficients are introduced. For arbitrary degrees p and q, such differential p-forms and q-vector fields are seen to be the solutions to two second-order partial differential systems on $J^2(M, \mathbb{R}^n)$, which are reducible to two first-order partial differential systems by adding variables. Computational aspects in solving these systems are discussed and examples and applications are also given.

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