# Analogue of the Duistermaat-van der Kallen Theorem for Group Algebras

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Let G be a group, R an integral domain, and VG the R-subspace of the group algebra R[G] consisting of all the elements of R[G] whose coefficient of the identity element 1G of G is equal to zero. Motivated by the Mathieu conjecture [M], the Duistermaatvan der Kallen theorem [DK], and also by recent studies on the notion of Mathieu subspaces introduced in [Z4] and [Z6], we show that for finite groups G, VG under certain conditions also forms a Mathieu subspace of the group algebra R[G]. We also show that for the free abelian groups G = Zn (n ≥ 1) and any integral domain R of positive characteristic, VG fails to be a Mathieu subspace of R[G], which is equivalent to saying that the Duistermaat-van der Kallen theorem [DK] cannot be generalized to any field or integral domain of positive characteristic.

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