



Multiple Commutator Formulas

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Let A be a quasi-finite R -algebra (i.e., a direct limit of module finite algebras) with identity. Let $I_i, i=0, \dots, m$, be two-sided ideals of A , $\mathrm{GL}_n(A, I_i)$ the principal congruence subgroup of level I_i in $\mathrm{GL}_n(A)$ and $E_n(A, I_i)$ be the relative elementary subgroup of level I_i . We prove a multiple commutator formula

$$[E_n(A, I_0), \mathrm{GL}_n(A, I_1), \mathrm{GL}_n(A, I_2), \dots, \mathrm{GL}_n(A, I_m)] = [E_n(A, I_0), E_n(A, I_1), E_n(A, I_2), \dots, E_n(A, I_m)],$$

which is a broad generalization of the standard commutator formulas.

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