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Markus Lohrey* (lohrey@eti.uni-siegen.de). *Knapsack problems for nilpotent groups.*

Recently, Myasnikov, Nikolaev and Ushakov considered classical knapsack related decision problems for arbitrary finitely generated (f.g.) groups. Among others, they studied the following problems for a f.g. group G (where elements of G are represented by finite words over the generators):

- Subset sum problem for G : Given $g_1, \dots, g_k, g \in G$, decide whether there exist $\varepsilon_1, \dots, \varepsilon_k \in \{0, 1\}$ such that $g = g_1^{\varepsilon_1} \cdots g_k^{\varepsilon_k}$.
- Knapsack problem for G : Given $g_1, \dots, g_k, g \in G$, decide whether there exist natural numbers $\varepsilon_1, \dots, \varepsilon_k \geq 0$ such that $g = g_1^{\varepsilon_1} \cdots g_k^{\varepsilon_k}$.

Among other results, Myasnikov et al. proved that for a f.g. virtually nilpotent group the subset sum problem can be solved in polynomial time.

We show that (i) there exists a f.g. 2-step nilpotent group G with an undecidable knapsack problem and (ii) that for every f.g. virtually nilpotent group the subset sum problem belongs to nondeterministic logarithmic space (a subclass of deterministic polynomial time). We conjecture that the subset sum problem for a f.g. virtually nilpotent group can be solved in deterministic logarithmic space. (Received September 11, 2014)