Problem #20 (Solved !)

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Summary: What is the best bound on the length of a derivation for a one-rule length-preserving string-re rewriting system?

What is the best bound on the length of a derivation for a one-rule length-preserving string-re writing (semi-Thue) system? Is it $O(n^2)$ ($n$ is the size of the initial term) as conjectured in [Métique85], or $O(n^k)$ ($k$ is the size of the rule) as proved there.

Remark

The upper bound is $n^2/4$ where $n$ denotes the length of the initiating string [Ber94]. The bound is reached by the derivation from $b^{n/2}a^{n/2}$ for the string rewriting system \{$ba \rightarrow ab$\}.

More about the history of this problem in the context of the question of one-rule termination can be found in [Der05].
Bibliography

