We shall choose inductively tape squares $\hat{p}_i^L$ and $\hat{p}_i^R$ (for $i = 1, 2, \ldots, e_2 + l + 2s - 2$) as follows:

Define $\hat{p}_1^L = p_j^L$ and $\hat{p}_1^R = p_1$.

Let $\hat{p}_i^L$ and $\hat{p}_i^R$ for an integer $i < e_2 + l + 2s - 2$ be defined. Then there is a tape square $\hat{p}_i$ such that during the computation of M on w_1, $\hat{p}_i$ is rewritten as the first of squares between $\hat{p}_i^L$ and $\hat{p}_i^R$. (The existence of such a $\hat{p}_i$ follows from the assumed properties of n and from the fact that between the squares 0 and $n + 1$ there cannot exist m_1 adjacent squares the contents of which would not be changed during the computation of M on w_1.)

Then

$$\left.\begin{array}{l} \hat{p}_{i+1}^L = \hat{p}_i \\ \hat{p}_{i+1}^R = \hat{p}_i^R \end{array}\right\} \quad \text{if} \quad \hat{p}_i \leqq \max\{0, \hat{p}_i^L\} + s\,,$$

and

$$\left.\begin{array}{l} \hat{p}_{i+1}^L = \hat{p}_i^L \\ \hat{p}_{i+1}^R = \hat{p}_i \end{array}\right\} \quad \text{otherwise}\,.$$

Among the words $P(\hat{p}_1^L, \hat{p}_1^R), P(\hat{p}_2^L, \hat{p}_2^R), \ldots, P(\hat{p}_{e_2+2s+l-2}^L, \hat{p}_{e_2+2s+l-2}^R)$ there exists a pair of E_2-equivalent words such that the difference between the number of the characters c and the number of the characters a in one word is smaller than the difference between the number of the characters c and the number of the characters a in the second word. Let such a pair be formed by the words $P(\hat{p}_{j_1}^L, \hat{p}_{j_1}^R)$ and $P(\hat{p}_{j_2}^L, \hat{p}_{j_2}^R)$, where $j_1, j_2 \in N$, $0 < j_1 < j_2 \leqq e_2 + 2s + l - 2$.

Now suppose that on the tape of M the word $w_2 = b^{l-1}w_1$ is written in such a way that the leftmost character of the word w_2 is written in the square $-l + 2$. Construct a word u by replacing the tape segment between $\hat{p}_{j_1}^L$ and $\hat{p}_{j_1}^R$ by the word $P(\hat{p}_{j_2}^L, \hat{p}_{j_2}^R)$ in the word w_2. If we remove all blank characters b in the word u we shall obtain a word u_1 accepted by M although it holds that $u_1 \in \{a, c\}^+ - L$:

$$u_1 = a^{n_1}c^{n_2}a^{n+m_2-m_1} \quad \text{where} \quad n_1, n_2 \in N\,, \quad n_1 + n_2 \leqq n\,.$$

(2.1.2.2) Let $2n - s < p_1 \leqq 2n + s$.

Contradiction can be deduced analogously as in the paragraph (2.1.2.1).

(2.2) Consider the language $L = \{a^m c^m \S a^n c^n;\ m, n = 1, 2, \ldots\}$. Evidently $L \in W(2)$ and it can easily be proved that $L \notin \text{LIN}$.

References

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