BOUNDED REACHABILITY PROBLEMS ARE DECIDABLE IN FIFO MACHINES

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Testing the reachability of a configuration in a general FIFO system is undecidable.

Brand, Zafiropulo 1983
INPUT-BOUNDED RUNS

Input language $\subseteq u^*v^*...w^*$
for $u, v, ..., w$ words in $\Sigma^*$
INPUT-BOUNDED RUNS

Example: \( L = a^*(cb)^* \)
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Theorem: The Input-Bounded Reachability Problem is decidable.
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Proof by reduction to counter machines with restricted zero tests.
## Summary of key results

|                | Letter-bounded | Bounded \(|Ch| = 1\) | Bounded \(|Ch| > 1\) |
|----------------|----------------|----------------------|----------------------|
| UNBOUND        | D              | D                    | D                    |
| TERM           | D              | EXPTIME              | D                    |
| REACH          | D              | EXPTIME              | D, not ELEM          |
| CS-REACH       | D              | EXPTIME              | D                    |

(D stands for Decidable, \(|Ch|\) denotes number of channels)
Thank you