## Best Student Paper Track B: The Identity Problem in $\mathbb{Z}\wr\mathbb{Z}$ is decidable

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Best Student Paper Track B

Abstract: We consider semigroup algorithmic problems in the wreath product  $\mathbb{Z} \wr \mathbb{Z}$ .

Our paper focuses on two decision problems introduced by Choffrut and Karhum\"{a}ki (2005): the \emph{Identity Problem} (does a semigroup contain the neutral element?) and the \emph{Group Problem} (is a semigroup a group?) for finitely generated sub-semigroups of  $\mathbb{Z} \wr \mathbb{Z}$ .

We show that both problems are decidable.

Our result complements the undecidability of the  $\mbox{emph}(\mbox{Semigroup Membership Problem})$  (does a semigroup contain a given element?) in  $\mathbb{Z} \wr \mathbb{Z}$  shown by Lohrey, Steinberg and Zetzsche (ICALP 2013), and contributes an important step towards solving semigroup algorithmic problems in general metabelian groups.

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