

UDC 517.6

LOCAL NEARRINGS WITH ADDITIVE GROUPS OF ORDER 128 AND EXPONENT 16

I. Iu. Raievska, M. Iu. Raievska

Institute of Mathematics of NAS of Ukraine, raeirina@imath.kiev.ua,
 raemarina@imath.kiev.ua

There exist 2328 non-isomorphic groups of order $128 = 2^7$ from which 65 are 2-generated groups of exponent 16 and only 16 of these groups are the additive groups of zero-symmetric local nearrings.

Let $[n, i]$ be the i -th group of order n in the SmallGroups library in the computer system algebra GAP [1]. We denote by C_n the cyclic group of order n .

Theorem 1. *Only the following groups of order 128 and exponent 16 are the additive groups of zero-symmetric local nearrings:*

<i>Id Group</i>	<i>Structure Description</i>	<i>Number of LNR</i>
[128, 42]	$C_{16} \times C_8$	>134754
[128, 43]	$C_{16} \rtimes C_8$	>133866
[128, 44]	$C_8 \rtimes C_{16}$	>145648
[128, 46]	$((C_{16} \times C_2) \rtimes C_2) \rtimes C_2$	>24704
[128, 47]	$((C_{16} \times C_2) \times C_2) \rtimes C_2$	252928
[128, 52]	$((C_{16} \times C_2) \rtimes C_2) \rtimes C_2$	>115840
[128, 53]	$((C_{16} \times C_2) \rtimes C_2) \rtimes C_2$	>277248
[128, 54]	$(C_4 \times C_2) \rtimes C_{16}$	>82944
[128, 55]	$(C_4 \times C_2).((C_4 \times C_2) \rtimes C_2) = (C_4 \times C_2).(C_8 \times C_2)$	640
[128, 59]	$C_4.((C_2 \times C_2 \times C_2) \rtimes C_4) = (C_4 \times C_2).(C_8 \times C_2)$	>13056
[128, 99]	$C_8 \times C_{16}$	>29248
[128, 102]	$C_8 \rtimes C_{16}$	>5376
[128, 106]	$(C_{16} \times C_2) \rtimes C_4$	>2808
[128, 107]	$(C_{16} \times C_2) \rtimes C_4$	>16460
[128, 108]	$(C_{16} \rtimes C_2) \rtimes C_4$	>1344
[128, 109]	$(C_{16} \rtimes C_2) \rtimes C_4$	>2344

The library of zero-symmetric local nearrings of order 128 on 2-generated groups can be extracted from [2] using the package LocalNR [3].

Acknowledgement. This work was partially supported by the Polish Academy of Sciences (PAN) and National Academy of Sciences (NAS)

1. The GAP Group, GAP – Groups, Algorithms, and Programming, Version 4.11.0; 2020, <https://www.gap-system.org>
2. Iryna Raievska, Maryna Raievska, & Yaroslav Sysak. (2022). DatabaseEndom128: (v0.1) [Data set]. Zenodo, <https://doi.org/10.5281/zenodo.6538441>

**The conference of young scientists «Pidstryhach readings – 2022»
May 25–27, 2022, Lviv**

3. Raievska, I., Raievska, M. and Sysak, Y., LocalNR, Package of local nearrings, Version 1.0.3 (2021) (GAP package), <https://gap-packages.github.io/LocalNR/>

**ЛОКАЛЬНІ МАЙЖЕ-КІЛЬЦЯ З АДИТИВНИМИ
ГРУПАМИ ПОРЯДКУ 128 ТА ЕКСПОНЕНТИ 16**

Знайдені всі неізоморфні групи порядку 128 з експонентою 16, які є адитивними групами локальних майже-кілець.