

## ALL MAXIMAL IDEMPOTENT SUBMONOIDS OF GENERALIZED COHYPERSUBSTITUTIONS OF TYPE $\tau = (2)$

NAGORNCHAT CHANSURIYA

*Faculty of Science, Energy and Environment  
King Mongkut's University of Technology North Bangkok (Rayong Campus)  
Rayong 21120, Thailand*

e-mail: nagornchat.c@sciee.kmutnb.ac.th

### Abstract

A generalized cohypersubstitution of type  $\tau$  is a mapping  $\sigma$  which maps every  $n_i$ -ary cooperation symbol  $f_i$  to the cotermin  $\sigma(f)$  of type  $\tau = (n_i)_{i \in I}$ . Denote by  $Cohyp_G(\tau)$  the set of all generalized cohypersubstitutions of type  $\tau$ . Define the binary operation  $\circ_{CG}$  on  $Cohyp_G(\tau)$  by  $\sigma_1 \circ_{CG} \sigma_2 := \hat{\sigma}_1 \circ \sigma_2$  for all  $\sigma_1, \sigma_2 \in Cohyp_G(\tau)$  and  $\sigma_{id}(f_i) := f_i$  for all  $i \in I$ . Then  $Cohyp_G(\tau) := \{Cohyp_G(\tau), \circ_{CG}, \sigma_{id}\}$  is a monoid. In [5], the monoid  $\underline{Cohyp_G(2)}$  was studied. They characterized and presented the idempotent and regular elements of this monoid. In this present paper, we consider the set of all idempotent elements of the monoid  $\underline{Cohyp_G(2)}$  and determine all maximal idempotent submonoids of this monoid.

**Keywords:** generalized cohypersubstitutions, idempotent submonoids, maximal submonoids.

**2010 Mathematics Subject Classification:** 20B10, 20M05, 20M10.

### REFERENCES

- [1] K. Denecke and K. Saengsura, *Separation of clones of cooperations by cohyperidentities*, Discrete Math. **309** (2009) 772–783.  
doi:10.1016/j.disc.2008.01.043
- [2] K. Denecke and S.L. Wismath, Universal Algebra and Coalgebra (World Scientific Publishing Co. Pte. Ltd., Singapore, 2009).
- [3] S. Jermjitpornchai and N. Saengsura, *Generalized Cohypersubstitutions of Type  $\tau = (n_i)_{i \in I}$* , Internat. J. Pure and Appl. Math. **86** (2013) 745–755.  
doi:10.12732/ijpam.v86i4.12

- [4] P. Kunama and S. Leeratanaveelee, *All Maximal Completely Regular submonoids of Hyp<sub>G</sub>(2)*, Discuss. Math. Gen. Alg. and Appl. **37** (2017) 105–114.  
doi:10.7151/dmga.1263
- [5] N. Saengsura and S. Jermjitsipornchai, *Idempotent and Regular Generalized Cohyper-substitutions of Type  $\tau = (2)$* , Internat. J. Pure and Appl. Math. **86** (2013) 757–766.  
doi:10.12732/ijpam.v86i4.13
- [6] W. Wongpinit and S. Leeratanaveelee, *All Maximal idempotent submonoids of Hyp<sub>G</sub>(2)*, Acta Univ. Sapientiae Math. **7** (2015) 106–113.  
doi:10.1515/ausm-2015-0007
- [7] W. Wongpinit and S. Leeratanaveelee, *All Maximal idempotent submonoids of Hyp<sub>G</sub>(n)*, Surveys in Mathematics and Its Applications **10** (2015) 41–48.

Received 4 December 2019

Revised 6 May 2020

Accepted 6 May 2020