TABLE I

NUMBER OF CYCLES WITH DIFFERENT LENGTHS IN LDPC CODES

Cycle length	g	g+2	g+4	g +6	g +8	g +10
(3, 6)-Regular (504, 252)[4] g = 8	1008	11718	83538	719271	6213312*	44975686
2640^{C1} g = 8	990	12870	91355	740850	6447210*	46438810
PEGirReg[5] 504×1008 g = 6	11538	408657	13110235	456677355*	16032995586*	
PEGReg[5] 504×1008 g = 8	2	11238	91101	748343	6493703*	56670375*
8000^{C2} g = 6	179	1218	9989	83089*	711987*	
10000^{C3} g = 6	161	1260	10051	83237*	713646*	
CCSDS[6] 7156×8176 g = 6	121618*	9594536*	692628818*	53914731591*	4268812405053*	

* Only for the proposed scheme.

+ Construction with random circulant permutation matrix

2640^{C1}: Margulis2640.1320.3[5]

8000^{C2}: 8000.4000.3.483[5]

10000^{C3}: 10000.10000.3.631[5]

[4] Juane Li, Shu Lin, Khaled Abdel-Ghaffar, "Improved message-passing algorithm for counting short cycles in bipartite graphs," 2015 IEEE International Symposium on Information Theory (ISIT).

[5] David J.C. MacKay, "Encyclopedia of sparse graph codes," http://www.inference.phy.cam.ac.uk/mackay/codes/data.html.

[6] Consultative Committee for Space Data Systems (CCSDS), "Recommendation for space data system standards," Sep. 2017.