

# Simple LTC Good LDPC Codes

David Ponnarovsky

January 30, 2023

## Abstract

We propose a new simple construction based on Tanner Codes, which yields a good LDPC testable code.

**ex1.** Find a simple description of the work-function algorithm in the case of uniform metric space.

**ex2.** Consider the following 3-point metric space,  $w(a, b) = 1$  and  $w(\cdot, c) = M$ . The initial configuration is  $\{b, c\}$  (2 servers). Show that randomized competitive ratio, for some value of  $M$  is  $> H_2 = 1 + \frac{1}{2}$ .

**ex3.** Show that randomized marking algorithm cannot be  $c$ -competitive against the adaptive online adversary, for  $c = o(k)$ .

**ex4 - Ski Rental.** At each step, the adversary decides either continue or stop. Stop terminate the game. If it continues, the online algorithm decides, either rent or buy. Rent costs 1 Buy costs  $M > 1$ . Design a primal-dual randomized online ski-rental algorithm with better than 2 competitive ratio.

**ex5.** Prove Yao's minimax principle.

$$\forall \text{rand. alg} \exists \sigma$$

$$\mathbf{E} \left[ c_{\text{alg}}(\sigma) : \text{alg} \sim \tilde{\text{alg}} \right] \geq c \cdot c_{\text{base}}(\sigma)$$