

Cycles in the burnt pancake graph

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The pancake graph P_n is the Cayley graph of the symmetric group S_n on n elements generated by prefix reversals. P_n has been shown to have properties that makes it a useful network scheme for parallel processors. For example, it is $(n - 1)$ -regular, vertex-transitive, and one can embed cycles in it of length ℓ with $6 \leq \ell \leq |S_n|$. The burnt pancake graph BP_n , which is the Cayley graph of the group of signed permutations B_n using prefix reversal as generators, has similar properties. Indeed, BP_n is n -regular and vertex-transitive. In this paper, we show that BP_n has every cycle of length ℓ with $8 \leq \ell \leq |B_n|$. The proof given is a constructive proof that utilizes the recursive structure of BP_n .

We also present a complete characterization of all the 8-cycles in BP_n for $n \geq 2$, which are the smallest cycles embeddable in BP_n , by presenting their canonical forms as products of the prefix reversal generators.

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