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Induced cycle structures of the hyperoctahedral group. (English)

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The n-dimensional hypercube Q_n is treated as a graph whose vertex set consists of sequences of 0's and 1's of length n, and the hyperoctahedral group B_n is the automorphism group of Q_n. Moreover, H_n denotes the permutation group induced by B_n on the set of edges of Q_n. The first objective of this paper is to obtain the cycle polynomials of both B_n and H_n. $K(G;x) = \frac{1}{|G|}\sum_k w_k x^k$ is called the cycle polynomial of a permutation group G (w_k is the number of permutations in G with k cycles). Furthermore, the cycle indices of both B_n and H_n are computed by counting fixed vertices and fixed edges of a signed permutation of a given type. The method applied in this paper can also be used for investigating other permutation groups induced by the wreath product of two permutation groups.

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Keywords : n-dimensional hypercube; hyperoctahedral group; automorphism group; permutation group; cycle polynomial; cycle indices

Classification :

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