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This work is concerned with zeta functions of two-dimensional shifts of finite type. A two-dimensional zeta function ? 0 (s) , which generalizes the Artin-Mazur zeta function, was given by Lind for Z 2 -action ? . In this paper, the n th-order zeta function ? n of ? on Z n×8 , n=1 , is studied first. The trace operator T n , which is the transition matrix for x -periodic patterns with period n and height 2 , is rotationally symmetric. The rotational symmetry of T n induces the reduced trace operator t n and ? n =(det(I-s n t n)) -1 .

The zeta function ?=? 8 n=1 (det(I-s n t n)) -1 in the x -direction is now a reciprocal of an infinite product of polynomials. The zeta function can be presented in the y -direction and in the coordinates of any unimodular transformation in GL 2 (Z) . Therefore, there exists a family of zeta functions that are meromorphic extensions of the same analytic function ? 0 (s) . The natural boundary of zeta functions is studied. The Taylor series for these zeta functions at the origin are equal with integer coefficients, yielding a family of identities, which are of interest in number theory. The method applies to thermodynamic zeta functions for the Ising model with finite range interactions.

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