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Form factors in sinh- and sine-Gordon models, deformed Virasoro algebra, Macdonald polynomials and resonance identities. (English) [Zbl 1284.81193](#)
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Summary: We continue the study of form factors of descendant operators in the sinh- and sine-Gordon models in the framework of the algebraic construction proposed in *B. Feigin* and the first author [*J. Phys. A, Math. Theor.* 42, No. 30, Article ID 304014, 32 p. (2009; [Zbl 1177.81121](#))]. We find the algebraic construction to be related to a particular limit of the tensor product of the deformed Virasoro algebra and a suitably chosen Heisenberg algebra. To analyze the space of local operators in the framework of the form factor formalism we introduce screening operators and construct singular and cosingular vectors in the Fock spaces related to the free field realization of the obtained algebra. We show that the singular vectors are expressed in terms of the degenerate Macdonald polynomials with rectangular partitions. We study the matrix elements that contain a singular vector in one chirality and a cosingular vector in the other chirality and find them to lead to the resonance identities already known in the conformal perturbation theory. Besides, we give a new derivation of the equation of motion in the sinh-Gordon theory, and a new representation for conserved currents.

MSC:

- [81T10](#) Model quantum field theories
- [81R10](#) Infinite-dimensional groups and algebras motivated by physics, including Virasoro, Kac-Moody, W -algebras and other current algebras and their representations
- [35Q55](#) NLS equations (nonlinear Schrödinger equations)
- [35R03](#) PDEs on Heisenberg groups, Lie groups, Carnot groups, etc.
- [81R12](#) Groups and algebras in quantum theory and relations with integrable systems
- [33D52](#) Basic orthogonal polynomials and functions associated with root systems (Macdonald polynomials, etc.)

Cited in **2** Documents

Full Text: [DOI](#) [arXiv](#)

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