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Energy-momentum tensor in the 2D Ising CFT in full modular space

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The energy-momentum tensor in the 2D Ising CFT is constructed on the lattice in both spin and fermionic variables. The expression is confirmed by conformal Ward identities on the torus. We work in hexagonal lattice (and by taking the dual, triangular lattice), which enables us to study it in the full range of the modular parameter τ [1] and further its role of deforming τ. In relation to that it is conjugate to the metric, it is more sensitive to the lattice geometry than the primaries. In fact, operator mixing in the components of the Symanzik-type operator, which happens on the non-regular lattices and remains as we approach the continuum limit, can be understood by a shift in the staggered structure of the lattice. For this nature of the operator, it can be a fundamental concept in defining lattice field theories on a curved manifold with a simplicial lattice, which is our ultimate goal [2].

[1] R. C. Brower and E. K. Owen, "Ising model on the affine plane," Phys. Rev. D **108**, no.1, 014511 (2023) [arXiv:2209.15546 [hep-th]].
[2] For pioneering work, see, for example: R. C. Brower, M. Cheng, G. T. Fleming, A. D. Gasbarro, T. G. Raben, C. I. Tan and E. S. Weinberg, "Lattice ϕ^4 field theory on Riemann manifolds: Numerical tests for the 2-d Ising CFT on $\mathbb{S}^2$," Phys. Rev. D **98**, no.1, 014502 (2018) [arXiv:1803.08512 [hep-lat]]; see also contributions by R. C. Brower and G. T. Fleming in this conference.

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