**NLsM Results**

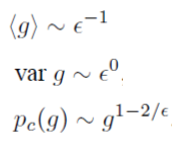
The orthogonal (β = 1) RG equation predicts a gc ~ 0.40, and ν = 0.67. This compares well with numerical simulations for gc, but not for the critical exponent, which is rather around 1.57. The cumulants of g have also been calculated from the NLsM. And these are the results (orthogonal ensemble I think), in 2+ε dimensions), at the critical point.



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| Comment: Obviously the NLσM uses Kubo formula in a sense to get g(L). So why isn’t it a problem for it? |

Note how this result seems to suggest a Cauchy-like distribution. This result was taken to suggest the failure of the single parameter scaling theory due to the length dependence of the moments. Alternatively, it was argued that the perturbative calculation simply became more erroneous as ε increased (reasonable). A compromise position is that the single parameter scaling theory only pertains to <g>, say.

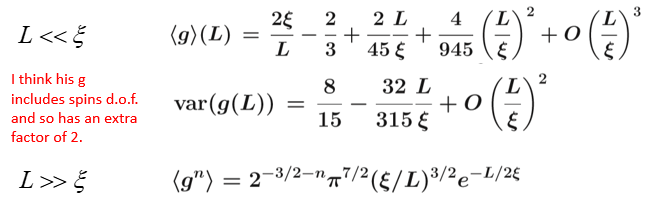
I believe that Shapiro (one of his papers) investigated the critical distribution in 2+ε, using these moments as a guide, and was able to show, with some reasonable suppositions, that the distribution was actually length-independent, and so satisfied the single-parameter scaling hypothesis. He obtained the following results:



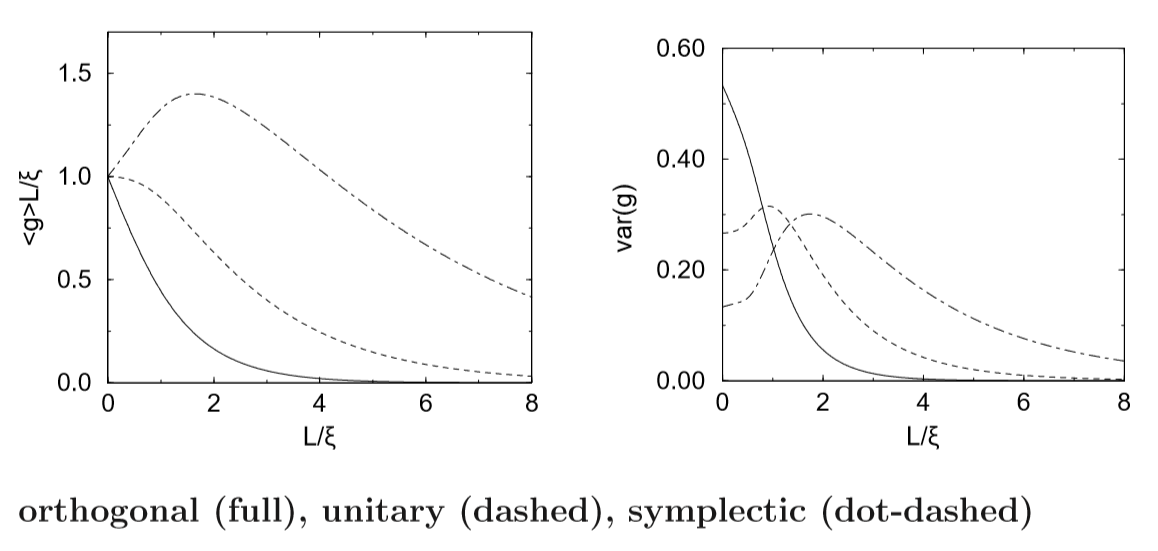
One can see that due to the tail, only moments up to n < 2/ε or so will exist. Shapiro coauthored a paper which predicted the distribution should mainly approach Gaussian as d 🡪 2.

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| In Beenaker’s review (pg. 35) he gives references for paper that derived the 1D NLsM from a white noise potential model. Check this out, since that would mean such a model reproduces DMPK too. |

I’ll state some of the results the model has produced…one is the exact results for <g>, and <g>2 in the Q1D geometry (just displaying orthogonal ensemble asymptotic results – I think this is from the 1D sigma model?).



And I’ve found some plots for <g>1,2 for the β = 1,2,4 ensembles:



And now the scaling function in 2+ε dimensions (t = 1/2πg, β = dlng/dlnL).

