

U18a Power index on the measurement of the variance from a Gaussian field

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The rms fluctuation (variance) σ of a cosmic field $a(x)$ is an important measure to quantify the initial fluctuation of the universe, and is usually determined by a formula $\sigma^2 = \langle a(x)^2 \rangle$. We investigate the necessity to use this specific formula, under the assumption that the initial fluctuation is random Gaussian distributed. We calculate the expected finite volume effect on σ obtained from a general formula $\langle |a(x)|^m \rangle$. We find that although the finite volume effect is minimum at the conventional choice $m = 2$, it is almost insensitive to m around $m=1$ to 3. Therefore we can reduce the relative contribution of tail parts which might be considerably contaminated by other effects (such as measurement errors) at a very small sacrifice of the finite volume effect.