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Analysis of calculation of the cosmological perturbation spectrum in the framework of Mukhanov's gauge-invariant approach.

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The purpose of the present work is calculation of the cosmological perturbation spectrum in a flat model with a scalar field in the slow-roll regime. Mukhanov's gauge-invariant approach for calculating the spectrum of gravitational perturbations is analyzed. In contrast to Mukhanov's paper [1] we calculate perturbation spectrums of gravitational and scalar fields separately. We use action of the system in the invariant form, quadratic for perturbations. Obtained expression leads to the equations for gravitational and scalar perturbations, by using slow-roll approximation. To calculate the perturbation spectrum, we need to solve these equations. As shown the solutions are ambiguous and depends on chosen approximations, so we are not able to obtain clear-cut solutions. So, it is desirable to look for other approaches to solve the discussing problem.

[1] Mukhanov V. F., Feldman H. A., Brandenberger R. H. Theory of cosmological perturbations. // Phys. Rep. 1992. Vol. 215. P. 203 – 233

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