**Abstract:**

In the context of a FLRW cosmological background metric we developed the first-order scalar cosmological perturbation theory in the weak gravitational field limit. In such approach, the gravitational potentials produced by matter fluctuations satisfy the Helmholtz type equations but not the Poisson ones. Therefore, these potentials are characterized by a finite time-dependent Yukawa interaction range being the same for each individual contribution and which is of the order of 3700 Mpc at the present time. Therefore, the gravitational potential of the n-th fluctuation is exponentially suppressed at such scales. This suppression is called the cosmological screening. The derived equations can form the theoretical basis for numerical simulations of a structure formation in the Universe for a wide class of cosmological models.