Bouncing models: problems of a realistic scenario

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We consider bouncing cosmological model proposed in (Katenar, Sahni and Shtanov, 2001). In this model bounce is introduces at the Planck energy. We calculate value of the scalar field at the point of bounce which appears to be $\phi_b = \frac{M_{pl}}{\sqrt{12\pi}} \ln \frac{M_{pl}}{m}$, where M_{pl} is the Planck mass, m is the mass of the scalar field. For a realistic ratio $m/M_{pl} \sim 10^{-6}$ this gives $\phi_b = 2$ and the number of e-foldings $N = 2\pi\phi_b^2 = 25$ which is insufficient for inflation. However, our numerical studies show that maximum value is reached sometime after the bounce and for $m = 10^{-6}M_{pl}$ can reach 3.2 with $N = 60$.

More problematic is to inlcude reheating in this model. If the reheating is irreversible (due to growing perturbations in the initially homogeneous matter), the energy loss of the order of M_{pl}/m makes the scalar field to be subdominant in comparison with the relativistic matter created during reheating even at the point of bounce, making inflation at the next cycle impossible.