K-matter as Mach's principle realization

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It is shown that if one takes into account Mach's principle in the form which follows from quantum theory and considers it as a complementary constraint between the parameters which characterize the energy density and geometry of the universe in addition to Einstein equations for a FRW universe, non-relativistic matter transforms into an analogue of K-matter. The exact solutions of the Einstein equations for the universe with such matter and cosmological constant are found. It is demonstrated that the Machian universe under consideration with a nonzero cosmological constant is equivalent to the open de Sitter universe. In the limit of zero cosmological constant such a universe evolves as a Milne universe, but in contrast to it, it contains matter with nonzero energy density. The possible application of proposed approach to the description of the present cosmological data is discussed. The problem of the age of the universe is considered as an example.

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