METRICAL EVOLUTION OF MULTIDIMENSIONAL UNIVERSES

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ABSTRACT. Fridman's cosmological equations generalisation have been received for arbitrary number of N-dimension space and their decision in ideal fluid model. The analise of values N influence on the type of universe's evolution have been shown from the point of antropic principle view in particular.

Key words: dimensional of space, evolution of universe, antropic principle.

Events development,which joints the early Universe cosmology with elementary particle physics, have led to appearance of ideas about great number of universes with different fundamental properties, with different number of space dimension in particular (Linde, 1990). Much attention is paed to idea how the manifestation of compressed into point space dimensionalities existing over ordinary three can explaine the visible fundamental interactions. The present paper concerns the next postquantum evolution of Universe with arbitrary number of space dimension from the point of view connecting the type of that evolution with antropic principle in particular.

Calculation of Kristophel's symbols and curvature tensor in Robertson's - Woker's metric at N-dimentional space leads to the next equation generalising Fridman's equation of standard cosmological model :

$$\dot{a}^2 = \frac{S_N G}{(N-1)c^2}\left(\frac{N+1}{N}\varepsilon - (N-3)p\right)a^2 - kc^2, \quad (1)$$

where a-scale factor, S_N-surface area of N-dimensional unit sphere [2], ε-energy density, p-pressure, k-curvature sign, c-light velocity. Once more equation (low of energy conservation) follows from the condition that energy - momentum tensor divergence is equal to 0. Calculation of the $T^{t\nu}_{;\nu}$ value gives us after the passage frome time t to variable a:

$$\frac{d}{da}(a^N\varepsilon) = -Na^{N-1}p, \quad (2)$$

The third equation allowing to found function $a(t), \varepsilon(t)$ and $p(t)$ is equation of matter state which look like: $p = \mu\varepsilon$ in the model of ideal fluid , where $\mid \mu \mid \leq 1$ by powerdominational condition. Payng attention to the fact that considered ussualy in cosmology equation of state $p = -\varepsilon$, $p = \varepsilon/3$ and $p = 0$ are the private cases of equation $p = M\varepsilon/3$ where M integer let's write the equation of state in our case as:

$$p = \frac{M}{N}\varepsilon; \quad \mid M \mid \leq N. \quad (3)$$

Excluding from (1), (2) and (3) the values ε and p we shell receive after separating of variables:

$$\int_{a_1}^{a} \frac{da}{\sqrt{\pm\left(\frac{a}{a_0}\right)^{2-(N+M)} - k}} = ct, \quad (4)$$

where

$$a_0^2 = \frac{c^4 N(N-1)}{S_N G\varepsilon_0 \mid (N+1-M(N-3)) \mid}, \quad (5)$$

ε_0-meaning ε when $a = a_0$, $a_1 = 0$ or a_0. The sign "-" accords to the values of M and N locating highter than the hyperbola $M - 1 = 4/(N-3)$ where the expression under the modulus sign is negative. First of all let's pay attention to the fact that underintegral expression in (4) depends symmetrically on parameters N and M by ful correspondence with ideas of modern common field theory about the connection of prysical matter properties with space dimension, but (4) is the consequence of GRT. It should be noted also that (4) is integrated in elementary functions only when $N+M = 0, 1, 2, 3, 4$ by Chebishev's theorem about differential binom and in hypergeometrical functions in common case.

Possible integral results (4) and their analyse, from the point of view eigther the appropriate cosmological model is closed or opened, are represented on fig.1 shematicalli.

It is visible fact that all typical for evolution of our Universe occasions can be realised with any N: $M = -N$ (the inflational stage), $M = 1$ (the radiation stage) and $M = 0$ (the matter stage). This allowes to assume the existance of some common nature of the Universe's with arbitrary number of dimension evolution. The idea about the definite relativity of antropic principle can follow from that. It consists in that the qualitative matter evolution may take place in universes with $N \neq$

3 but in types which are different from the existance of electrostatically (atoms) and gravitationally (multiple stars and planets system) connected system. The last, as it is known, is the consequence of special properties of the task with two bodies in three-dimensional space decision.

Also the question about the studing of another Universes possibility appears in the case of their existance idea confirmation. But in such case will the abstract about the experience (experiment) as the source of know ledge acquiring be true. Such studing will be possible only on the base of controling appropriate theory about observing in our Universe, e.g. basically the nature of knowledge acquiring process will not change. But again manifestation measure of this process through another phenomena will essentially grow. As it have taken place when passing from macrocosm studing to microcosm and megacosm studing.

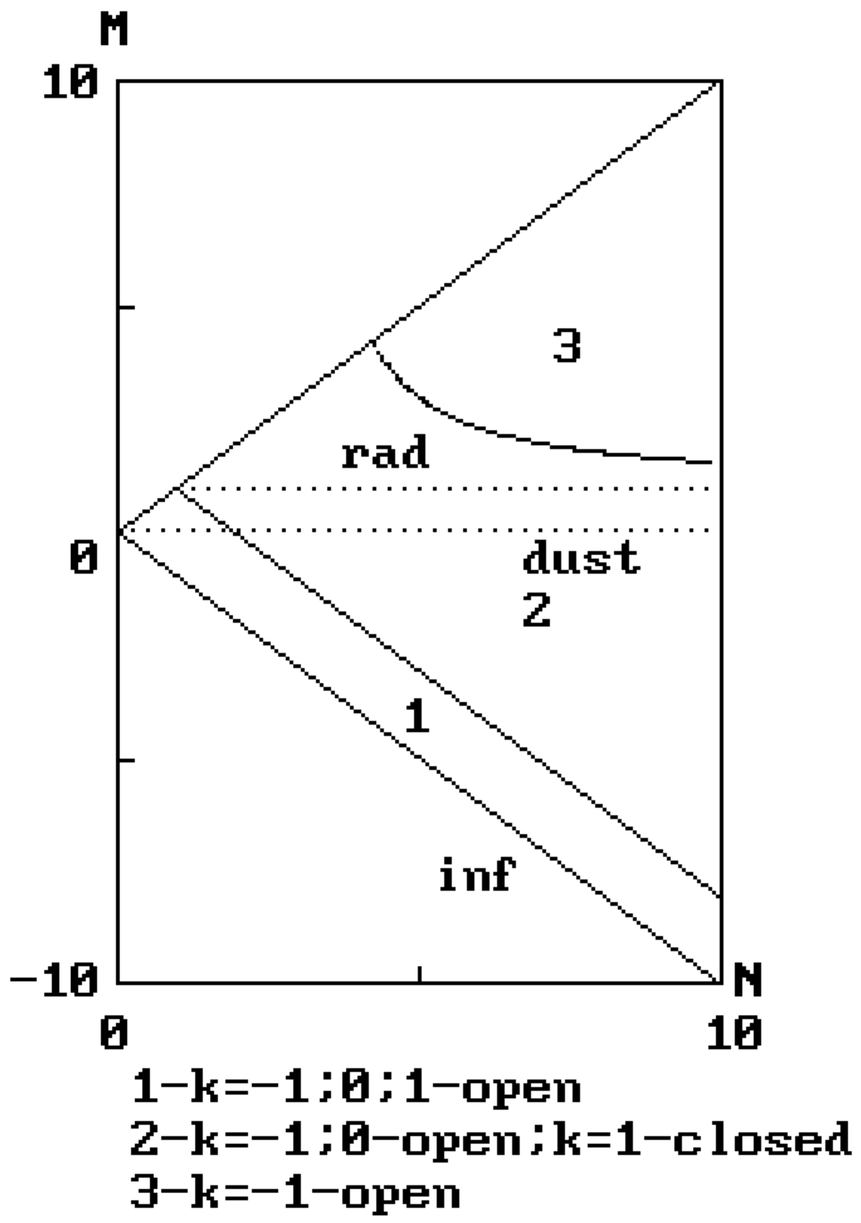

Figure 1. The dependence of cosmological models from parameters N and M.

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2D CALCULATIONS OF COLLAPSE OF ROTATING MAGNETIZED BODIES

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ABSTRACT. 2D numerical simulation of the collapse of rotating magnetized cloud has been made as preliminary investigation of magnetorotational mechanism of supernova explosion. The part of envelope of the cloud is throwing out when magnetic pressure becomes comparable with gas pressure. The amount of mass of the envelope thrown out and the energy it carries away are estimated.

Key words: stellar dynamics, magnetohydrodynamics, numerical methods

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