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A FRESH VIEW OF COSMOLOGICAL MODELS DESCRIBING VERY EARLY UNIVERSE: GENERAL SOLUTION OF THE DYNAMICAL EQUATIONS

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The dynamics of any spherical cosmology with a scalar field ("scalaron") coupling to gravity is described by the nonlinear second-order differential equations for two metric functions and the scalaron depending on the "time" parameter. The equations depend on the scalaron potential and on arbitrary gauge function that describes time parameterizations. This dynamical system can be integrated for flat, isotropic models with very special potentials. But, somewhat unexpectedly, replacing the independent variable t by one of the metric functions allows us to completely integrate the general spherical theory in any gauge and with arbitrary potentials. In this approach, inflationary solutions can be easily identified, explicitly derived, and compared to the standard approximate expressions. This approach is also applicable to intrinsically anisotropic models with a massive vector field ("vecton") as well as to some noninflationary models.

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