

HOMOGENEOUS THREE-DIMENTIONAL SPACES AND COSMOLOGICAL MODELS

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As it is well known from the topological point of view, there exist 18 different types of curved three-dimensional locally Euclidean spaces: 10 oriented and 8 non-oriented (like two-dimensional Mubius band). Modern cosmology employs only one of 10 oriented homogeneous spaces. In many respects alternative four-dimensional Riemannian homogeneous spaces are poorly understood because of complicate structure of Einstein equations. We study the restrictions for the metric tensor and its derivatives, which follow from symmetry conditions of three parameter group Lie for scalar differential operators, which work in finite region of the four-dimensional Riemannian space-time. These restrictions in combination with the algebraic properties of the metric tensor, as well as with the Petrov-Penrose classification of the curvature tensor enable us to simplify Einstein equations and to find out its new solutions.