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On homogeneous and isotropic universe

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We give a simple example of space-time metric, illustrating that homogeneity and isotropy of space slices at all moments of time is not obligatory lifted to a full system of six Killing vector fields in space-time, thus it cannot be interpreted as a symmetry of a four dimensional metric. The metric depends on two arbitrary and independent functions of time. One of these functions is the usual scale factor. The second function cannot be removed by coordinate transformations. We prove that it must be equal to zero, if the metric satisfies Einstein's equations and the matter energy momentum tensor is homogeneous and isotropic. A new, equivalent, definition of homogeneous and isotropic space-time is given.

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