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Riemannian space-time, de Donder Conditions and Gravitational Field in Flat Space-time GORDON LIU, Copernicus Institute for Physics and Astronomy — Let the coordinate system x^i of flat space-time to absorb a second rank tensor field Φ_{ij} of the flat space-time deforming into a Riemannian space-time, namely, the tensor field $\Phi_{\mu\nu}$ is regarded as a metric tensor with respect to the coordinate system x^μ. After done this, the x^μ is not the coordinate system of flat space-time anymore, but is the coordinate system of the new Riemannian space-time. The inverse operation also can be done. According to these notions, The concepts of the absorption operation and the desorption operation are proposed. These notions are actually compatible with Einstein's equivalence principle. By using these concepts, the relationships of the Riemannian space-time, the de Donder conditions and the gravitational field in flat space-time are analyzed and elaborated. The tensor field of gravitation can be desorbed from the Riemannian space-time to the Minkowski space-time by using the de Donder conditions. Einstein equations with de Donder conditions can be solved in flat space-time. Base on Fock's works, the equations of gravitational field in flat space-time are obtained, and the tensor expression of the energy-momentum of gravitational field is found. They all satisfy the global Lorentz covariance.

Gordon Liu
Copernicus Institute for Physics and Astronomy

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