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Space-time Geometry

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The problem of variables and components separation in Maxwell equations in the Minkowski space-time is considered. It is shown that unlike scalar equations for which solution of the problem reduces to choice of special coordinate system (confocal ellipsoidal system and its limiting cases), separation of Maxwell equations requires special choice of the field of local frames. The problem of constructing special fields of local frames leads to geometrical analysis of coordiante systems and congruences of straight lines in the space-time. The procedure of separation of Maxwell equation is demonstrated in the case of circular paraboloid coordinates.