

# The Einstein-Yang-Mills equations in gauge spaces of order $k$

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In the  $(k+1)n$  dimensional space  $P$ , where the transformation group is given by

$$y^{0a'} = y^{0a'}(y^{0a}), \quad y^{1a'} = y^{1a'}(y^{0a}, y^{1a}), \quad \dots, \quad y^{ka'} = y^{ka'}(y^{0a}, y^{1a}, \dots, y^{ka})$$

the adapted basis in tangent and its dual space is constructed.

The Einstein-Yang-Mills equations which give the extreme value of integral of action

$$I(\phi) = \int_{\Omega} \sqrt{g} L(\phi, \partial_{0a}\phi, \partial_{1a}\phi, \dots, \partial_{ka}\phi) d\omega$$

( $L$  is Lagrangian,  $g$  is the determinant of the metric tensor) are determined.