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# On generalized Melvin's solution corresponding to the Lie algebra $E_6$

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A multidimensional generalization of Melvin's solution (originally describing the gravitational field of a magnetic flux tube in four dimensions) is considered. Being defined in $D$-dimensional spacetime, the generalized solution is also related to an arbitrary simple Lie algebra
$calG$ corresponding to some hidden symmetries of the master equations of the model. The gravitational model contains $n$ 2-forms and $l \geq n$ scalar fields, where $n$ is the rank of
$calG$. The solution is governed by a set of $n$ functions $H_s(z)$ obeying $n$ ordinary differential equations with certain boundary conditions imposed. It was conjectured earlier that these functions should be polynomials (the so-called fluxbrane polynomials). The polynomials $H_s(z)$, $s = 1, \ldots, 6$, for the Lie algebra $E_6$ are obtained and a corresponding solution for $l = n = 6$ is presented. The polynomials depend on integration constants $Q_s$. They obey symmetry and duality identities. The latter ones are used in deriving asymptotic relations for solutions at large distances. The power-law asymptotic relations for $E_6$-polynomials at large $z$ are governed by integer-valued matrix $\nu = A^{-1}(I + P)$, where $A^{-1}$ is the inverse Cartan matrix, $I$ is the identity matrix and $P$ is permutation matrix, corresponding to a generator of the $Z_2$-group of symmetry of the Dynkin diagram. The 2-form fluxes $\Phi^s$ are calculated.

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