OPTIMAL SYSTEM OF SUBALGEBRAS FOR SUM OF TWO IDEALS $\mathfrak{aff}(\mathbb{R}) \oplus \mathfrak{sl}(2, \mathbb{R})$. INVARIANT SOLUTIONS

ALEKSANDR PANOV

Symmetry algebra of partial differential equation [1]

$$u_t - u_{txx} = u^{-3}$$

is direct sum of algebra of affine transformations group $Aff(\mathbb{R})$ and algebra of projective transformations group $SL(2, \mathbb{R})$ [2]. There is basis of this algebra

$$Y_1 = \partial_t,\ Y_2 = t\partial_t + \frac{u}{4}\partial_u,\ Y_3 = \partial_x,$$

$$Y_4 = \frac{1}{2}(e^{2x}\partial_x + e^{2x}u\partial_u),\ Y_5 = \frac{1}{2}(e^{-2x}\partial_x - e^{-2x}u\partial_u).$$

Table of commutators is

	Y_1	Y_2	Y_3	Y_4	Y_5
Y_1	0	Y_1	0	0	0
Y_2	$-Y_1$	0	0	0	0
Y_3	0	0	0	$2Y_4$	$-2Y_5$
Y_4	0	0	$-2Y_4$	0	$-Y_3$
Y_5	0	0	$2Y_5$	Y_3	0

Optimal system of subalgebras [3] is constructed for this algebra. Invariant solutions of equation are found for one-dimensional subalgebras.

References

[1] L.V. Ovsyannikov, *Group Analysis of Differential Equations*. Nauka, Moscow, (1978).

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[3] L.V. Ovsyannikov, "On the optimal system of subalgebras", *Doklady Mathematics*, Vol. 48, No. 3, 645–649 (1994).

Chelyabinsk State University, Br. Kashirinych, 129, Chelyabinsk, 454001, Russia

E-mail address: gjd@bk.ru