



It is known that human thinking is activated when there is some problematic situation. So we decided to include to the book some experiments and experimental tasks that create problematic situations. For example, experimentally for filament bulbs was determined voltage characteristic, which proved a curve, not a straight line, as was found previously in study of metal conductors [2, p. 99]. Pupils should task themselves of studying the dependence of conductors resistance on temperature.

The introduction of study the construction and operation of modern equipment and facilities (such as a computer display, the elements of PC motherboard, etc.) in the course “Electrodynamics” aimed to ensure growth and knowledge of pupils’ interests.

The given book can also be used for training pupils who learns Physics in accordance with programs for both standard and profile levels.

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A GENERIC CLASSIFICATION OF THE EQUATION OF FILTRATION

The determination of many fundamental problems of different nature needs building and solving mathematical models of the processes under investigation. In many cases, the concept of mathematical model is corresponding to some completely defined differential equations, which allow solutions with a certain accuracy to describe the process. Typically, the differential equations and additional conditions (initial, boundary) derived both from the general laws (e.g. conservation laws), and specific laws, are typical to each process (they reflect its most characteristic features).

If we consider a set of differential equations and a set of transformation groups isolated from one another, the issue of classification of objects belonging to them are considered on the basis of input attributes of different nature. That’s way, for differential equations linearity and quasilinearity can be featured as classification properties. For transformation groups isomorphism and homomorphism, structural



properties and many others are taken for these signs. However, the group set the analysis of these two studies together, on the basis of conformity between the system of differential equations and its group of invariance.

This property is a mapping and leads to expansion of opportunities for each classification properties of these sets. Since the mapping “equation → transformation group” is not biunique, the effect of transformations on classification opportunities for differential equations should be, generally speaking, more powerful than the reverse effect. Therefore the problem of group classification of differential equations is highlighted.

Following the analysed works [1;2], we shall realise doable group classification of the form

$$u_t = f(u_x)u_{xx}, \text{ where } f \neq 0 \quad (1)$$

The algorithm method of Lie- Ovsianikov classification differential equations lies in the following steps realization:

- using the standard method of Lie, we find a core group symmetry of the studied equations defining the system and ranging relation;
- implementing a construction group of equivalence transformations ε the studied equation;
- using the conversion with the group ε , conduct analysis ranging relation and find the possible specifications of an arbitrary element, which is studied in the equation;
- for each of the obtained values with an arbitrary element we solve the determining system and investigate the possibilities expand basic group symmetry of the equation.

So, the method of Lie-Ovsianikov’s classification of differential equations is effective in cases where the analysis can be developed full classification relations. The first step of the algorithm Li-Ovsianikov shows that in case of an arbitrary function $f = f(u_x)$ equation (1) admits four-dimensional invariance algebra with basis:

$$v_1 = \partial_t, v_2 = \partial_x, v_3 = 2t\partial_t + x\partial_x + u\partial_u, v_4 = \partial_u.$$

Equality

$$\frac{f'}{f} = \frac{a + 2bu_x}{c + du_x - 2bu_x^2} \quad (2)$$

we call ranging ratio.



First move to the analysis than ranging relation (2), do the next stage of the algorithm method of Lee-Ovsyannikov, which envisages the construction of the transformation group equivalence ε . To construct ε can be used as a direct method and by the infinitesimal method, which enables relatively easy to calculate its continuous subgroup ε_c ,

$$\begin{aligned}\bar{t} &= \alpha t + \gamma_1, \quad \bar{x} = \beta_1 x + \beta_2 u + \gamma_2 \\ \bar{u} &= \beta_3 x + \beta_4 u + \gamma_3, \quad \bar{f} = (\beta_1 + \beta_2 u_x)^2 f \cdot \frac{1}{\alpha}\end{aligned}\quad (3)$$

with coefficients

$$\begin{aligned}\beta_1 &= a_5, \quad \beta_2 = a_6, \quad \beta_3 = a_5 a_7 a_8, \quad \beta_4 = (1 + a_6 a_7) a_8, \\ \alpha &= a_4, \quad \gamma_1 = a_1 a_4, \quad \gamma_2 = a_2 a_5 + a_3 a_6, \\ \gamma_3 &= (a_3 + a_2 a_5 a_7 + a_3 a_6 a_7) a_8,\end{aligned}$$

(where a_i – parameter subgroup with operator E_{i_s}) which is then supplemented by the group of ε . To complement the constructed continuous group ε_c , note that the mapping $t \rightarrow -t$, $x \rightarrow -x$ is also contained in the group of ε . Accompanied them, get the transformation (3) with arbitrary coefficients α , β_i , γ_i , satisfying only condition nondegenerate $\alpha(\beta_1 \beta_4 - \beta_2 \beta_3) \neq 0$.

The next stage of group classification of equation (1) provides for the analysis ranging relation (2). For this we use that equivalence ratio equation (1) can be transferred to equation (2): after the equivalence transformation (3) equation (2) looks like:

$$\frac{\bar{f}'}{\bar{f}} = \frac{\bar{a} + 2\bar{b}\bar{u}_x}{\bar{c} + \bar{d}\bar{u}_x - 2\bar{b}\bar{u}_x^2}$$

The set of equations (2) breaks into classes of equivalence, which after integration gives the following value functions with the proper additional symmetry operators

$$f = \exp(u_x), \quad \frac{\bar{f}'}{\bar{f}} = 1;$$

$$f = u_x^{\sigma-1}, \quad \frac{\bar{f}'}{\bar{f}} = \frac{\sigma-1}{\bar{u}_x}, \quad \sigma \geq 0;$$

$$f = (1 + u_x^2)^{-1} \exp(\nu \arctan u_x), \quad \frac{\bar{f}'}{\bar{f}} = \frac{\nu - 2\bar{u}_x}{1 + \bar{u}_x^2}, \quad \nu \geq 0$$

The last stage involves solving the determining equations for each function with the obtained values.

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ESSAY WRITING AS AN EFFECTIVE EXERCISE IN COMMUNICATION

Writing is known to be one of the best ways to express feelings and thoughts which sometimes cannot be verbally conveyed. Besides, there are many times when we may be required to write an essay as a kind of project at school or at university, professional assignment, or just as a kind of English exam.

The study of literary sources proves the existence of different ways of treating the investigated phenomenon in scientific and methodical fields. So, one of its definitions is a “prose composition with a focused subject of discussion” or a “long, systematic discourse” [1].

A well known New Webster’s Dictionary and Thesaurus of the English Language explains essay as a writing (often quite short) dealing with a particular subject [2, p. 322]. According to another acknowledged source the definition of an essay is understood as vague enough, for it overlaps with those of an article or a short story. “An essay is a piece of writing which is often written from an author’s personal point of view. Essays can consist of a number of elements, including: literary criticism, political manifestos, learned arguments, observations of daily life, recollections, and reflections of the author [3].

While working at the problem, we also face an interesting thing, that there is no the only classification of essays’ types. They are rather different and require research as well. Besides, we should remember, that the different varieties of essay will require different types of writing and sometimes a single essay will require more than one type of writing. The analysis of essay types classifications just encourage the researcher to work hard if he wants to clarify the problem. Commonly these types are really different according to different classifications: *five-paragraph essay; cause and effect essay; classification essay; admission essay; argumentative essay; comparative essay; critical*