



The 9th International Conference on Differential and Functional Differential Equations



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ABSTRACTS

Moscow, Russia,
June 28 – July 5, 2022

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**The 9th International Conference
on Differential and Functional Differential Equations**

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ABSTRACTS



RUDN University
Steklov Mathematical Institute of the RAS
Lomonosov Moscow State University

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Smooth solutions of hyperbolic differential-difference equations in a half-space

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In the present paper, we study the existence of smooth solutions of two hyperbolic differential-difference equations in the half-space $\{(x, t) | x \in \mathbb{R}^n, t > 0\}$.

The first of these equations contains superpositions of differential operators and shift operators with respect to each of the spatial variables,

$$u_{tt}(x, t) = a^2 \sum_{j=1}^n u_{x_j x_j}(x, t) + \sum_{j=1}^n b_j u_{x_j x_j}(x_1, \dots, x_{j-1}, x_j - h_j, x_{j+1}, \dots, x_n, t),$$

where $a > 0$, $b_1, \dots, b_n$, and $h_1, \dots, h_n$ are given real numbers.

The second equation contains a sum of differential operators and shift operators with respect to each of the spatial variables,

$$u_{tt}(x, t) = c^2 \sum_{j=1}^n u_{x_j x_j}(x, t) - \sum_{j=1}^n d_j u(x_1, \dots, x_{j-1}, x_j - l_j, x_{j+1}, \dots, x_n, t),$$

where $c > 0$, $d_1, \dots, d_n$, and $l_1, \dots, l_n$ are given real numbers.

Three-parameter families of solutions are constructed for these equations. In this case, some ideas of papers [1–3] were used.

We prove theorems showing that the solutions obtained are classical ones provided that the real parts of the symbols of the corresponding differential–difference operators are positive. Classes of equations for which these conditions are satisfied are given. Detailed results of the study are published in [4].

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A. A. Tolchennikov	
Solution of the two-dimensional massless Dirac equation with linear potential and localized right-hand side	120
Kh. G. Umarov	
Blow-up and global solvability of the Cauchy problem for the equation of non-linear long longitudinal waves in a viscoelastic rod	120
V. B. Vasilyev	
On some questions in the theory of elliptic boundary-value problems	121
Yu. Vassilevski, A. Danilov, A. Lozovskiy, M. Olshanskii	
Stable numerical schemes for modelling incompressible fluid flows in time-dependent domains	122
L. Véron	
Boundary singular problems for mixed quasilinear equations	123
V. V. Vlasov	
Spectral analysis of Volterra integro-differential equations and associated semigroups of operators	124
V. Volpert	
Mathematical modelling of respiratory viral infections	125
R. Yang	
Maxwell's equations and Yang–Mills equations in complex variables	125
N. V. Zaitseva	
Smooth solutions of hyperbolic differential-difference equations in a half-space	126
M. L. Zaytsev	
Peculiarity of solutions of Laplace equation as applied to the problem of describing the motion of a hydrodynamic discontinuity in a potential and incompressible flow in an external region	127
M. Zefzouf, M. Fabien	
A new symmetric interior penalty discontinuous Galerkin formulation for the Serre–Green–Naghdi equations	127
K. N. Zhuikov	
On the index of differential-difference operators in an infinite cylinder	128
A. A. Алиханов	
Нелокальная краевая задача Стеклова первого класса для уравнения теплопроводности	129
K. B. Бойко	
Вырожденное линейное уравнение с несколькими дробными производными Герасимова–Капуто	130
M. B. Булатов, Е. В. Маркова	
Коллокационно-вариационные подходы к решению интегральных уравнений Вольтерра I рода	131
B. B. Веденяпин, Н. Н. Фимин, В. М. Чечеткин	
Вывод уравнений электродинамики и гравитации из принципа наименьшего действия Гильберта–Эйнштейна–Паули	132
B. Ф. Вильданова	
Энтропийное решение для уравнения с сингулярным потенциалом в гиперболическом пространстве	134