# CONSTRUCTIVE SOLUTION OF AN INVERSE PROBLEM FOR INHOMOGENEOUS ORDINARY DIFFERENTIAL EQUATION WITH CONSTANT COEFFICIENTS

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Let

$$y^{(k)} + a_1 y^{(k-1)} + \ldots + a_k y = \lambda Q, \tag{1}$$

be an ordinary linear differential equation, where $a_1, ..., a_k, \lambda$ are unknown constant complex numbers and $Q$ is the given finite exponentially harmonic sum, i.e., the sum of the form $Q(t) = \sum\limits_{k=1}^{m} e^{\lambda_k t} \cdot P_k(t)$. In general, the $\lambda_1, ..., \lambda_m$ and the coefficients of the polynomials $\{P_k\}_1^m$ are complex numbers. The boundary conditions for determination of the solution $y$ in (1) are its given values at a finite number of an uniform net points, i.e.

$$y(t_k) = f_k, \qquad t_k = t_0 + kd, \quad d > 0, \quad k = 0, 1, \ldots, N, \tag{2}$$

where $d$ is a fixed step.

Among the approaches to solving the above problem at different restrictions on parameters in equation (1) and in the conditions (2), we name the Prony algorithm and its modifications (see, e.g., [1, Chapter 10], [2, Chapter 2]). The talk is devoted to description of an constructive solution of this problem (*Prony operator*). For an homogeneous equation this problem was solved in [2, Chapter 2].

**REFERENCES** [1] Marple S.L., Jr. Digital Spectral Analysis with Applications. Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1987. [2] Maergoiz L.S. Asymptotics Characteristics of Entire Functions and Their Applications in Mathematics and Biophysics. Novosibirsk:"Nauka", Siberian Branch, 1991. - 272 p (Russian); English transl., Second edition (revised and enlarged). - Dordrecht/Boston/London: Kluwer Academic Publishers, 2003. - 362 p.