Antoni Leon Dawidowicz
Institute of Mathematics, Jagiellonian University, ul. Łojasiewicza 6, 30-348 Kraków, Poland
e-mail: `Antoni.Leon.Dawidowicz@im.uj.edu.pl`
Anna Poskrobko
Faculty of Computer Science, Białystok University of Technology, ul. Wiejska 45A, 15-351 Białystok, Poland
e-mail: `a.poskrobko@pb.edu.pl`
Jerzy Leszek Zalasiński
Tarnów Regional Development Agency SA, ul.Szujskiego 66, 33-100 Tarnów, Poland

Mathematical model of bioenergetic process in green plants with delayed argument

In this presentation the system of ordinary differential equations which describe the bioenergetics of green plants is constructed. This model is the mosification of presented in [1] We use three variables in the proposed model:

- x - the part of biomass of green plants participating in bioenergetic processes;
- y - the level of ATP i.e. the mass of this compound;
- z - the level of non-organic phosphorus taking part in bioenergetic i.e. the total mass of anions PO_4^{3-} absorbed from soil after dissociation of phosphates.

We consider the following nonlinear system of first order equations with delayed argument describing the bioenergetic processes in green plants

$$
\begin{cases}
x'(t) &= \varphi(t)x(t) - c_1(x(t)y(t))^\gamma \\
y'(t) &= c_2 x(t)z(t)(Ax(t-\tau) - y(t-\tau))^+ - c_3(x(t)y(t))^\gamma \\
z'(t) &= H(x)c_4(c_5 x(t) - z(t)) - c_6 x(t)z(t)(Ax(t-\tau) - y(t-\tau))^+
\end{cases}.
$$

We present proofs of the existence and the uniqueness of the solution of the problem and results of computer experiments.

References

[1] A. L. Dawidowicz, J. L. Zalasiński *Mathematical model of bioenergetic process in green plants* Proceedings of the XVI National Conference Applications of Mathematics to Biology and Medicine, Krynica, September 14-18, 2010