

Modeling the Growth of *Pseudomonas putida* by Gompertz Dynamic Equations

ELVAN AKIN

Department of Mathematics and Statistics, Missouri University S&T, USA
E-mail: akine@mst.edu

NESLIHAN NESLIYE PELEN

Department of Mathematics, Ondokuz Mayıs University, Turkey
E-mail: nesliyeaykir@gmail.com

ISMAIL UGUR TIRYAKI

Department of Mathematics, Abant İzzet Baysal University, Turkey
E-mail: ismailutiryaki@gmail.com

In this study, we propose two Gompertz dynamic equations to describe the growth of the *Pseudomonas putida* and use the variation of parameters formulas on time scales (nonempty close subsets of real numbers, [2, 3]) to show the existence and uniqueness of the solutions of initial value problems of Gompertz equations. In order to observe the best fit with the measurement results of the growth pattern, we use mathematica and data analysis tools such as Adjusted R-squared, R-squared, Anova, Estimated Variance and Kolmogorov Smirnov test. Finally, we conclude that the Gompertz dynamic equation involving the forward jump operator makes the best fit to data which are taken from [1].

References

- [1] G. Annadurai, B.S. Rajesh, V. R. Srinivasamoorthy, *Development of mathematical models (Logistic, Gompertz and Richards models) describing the growth pattern of Pseudomonas putida(NICM 2174)*, Bioprocess Engineering, **Vol.23**, (2000), pp.607-612.
- [2] M. Bohner, and A. C. Peterson, *Dynamic Equations on Time Scales: An Introduction with Applications*, Birkhauser, 2001.
- [3] M. Bohner and A. C. Peterson, *Advances in Dynamic Equations on Time Scales*, Birkhauser, 2003.