

CONGRESS BOOK



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BLACK SEA SUMMIT

8th INTERNATIONAL APPLIED SCIENCES CONGRESS

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*BLACK SEA SUMMIT
8th INTERNATIONAL APPLIED SCIENCES CONGRESS
MARCH 5- 6, 2022
ORDU*

Edited By

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CONGRESS ID

**BLACK SEA SUMMIT
8TH INTERNATIONAL APPLIED SCIENCES CONGRESS**

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March 5- 6, 2022
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Meeting ID: 845 7289 4181
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| 05. 03. 2022 | | 10: 00 – 12:00 |
|---|---|-----------------|
| Meeting ID: 845 7289 4181 | | Passcode: 50322 |
| HALL: 3 SESSION: 1 | MODERATOR: DR. ÖĞR.ÜYESİ VEDAT KADİR ÖZKAN | |
| DR. ÖĞR.ÜYESİ VEDAT KADİR ÖZKAN | Marmaris Halk Plajı Kumunda Fungal Çeşitliliğin Belirlenmesi | |
| SEVGİ ŞENGÜL AYAN | Comparing Nonlinear Optimization Techniques To Predict Dynamic Parameters Of Biological Processes In Nonlinear Differential Equation Models | |
| FUYANG PENG DONGHONG LI | Design Of A Service-Enabled Dependable Integration Environment | |
| ERKAN ÖZDURAN | Literatürde Rehabilitasyon Alanında Scı/Scı-E İndekslenen Dergilerde Yayımlanan Hayvan Çalışmaları: Bibliografik Bir Analiz | |
| SERDAR YEDİER | Morphometric Comparison Of Blind And Eye Side Scales Of Scophthalmus rhombus (L., 1758) In The Middle Black Sea | |
| FEYZİ SİNAN TOKALI | Potansiyel Biyolojik Aktif Yeni Bir Kinazolinon-Fenolik Mannich Bazı Hibridinin Sentezi | |
| MOHD FARIDZ AHMAD MUHAMMAD AMIR ASYRAF ROSLI | Effects Of Aerobic Dance On Cardiovascular Level And Body Weight Among Women | |
| ÖMER AYIK AHMET EMRE PAKSOY | El Bilek Patolojilerinde MRG Güvenilirliği Ve Artroskopi | |
| MURAT TAŞKIN UĞUR KAYIK AZİZ DEMİRCİ MUHAMMET ÇAĞATAY ENGİN | Metakarp Kırıklarında İntrameduller Vida Tespiti | |

COMPARING NONLINEAR OPTIMIZATION TECHNIQUES TO PREDICT DYNAMIC PARAMETERS OF BIOLOGICAL PROCESSES IN NONLINEAR DIFFERENTIAL EQUATION MODELS

Sevgi ŞENGÜL AYAN

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ABSTRACT

The modeling of nonlinear dynamics, which has been a significant research topic for half a decade. During the development process, the modeler creates a model that is as close to the underlying real dynamics as possible. It is extremely difficult to evaluate the numerous parameters that appear in the nonlinear equations in a way that does not cause the parameter estimates of the dynamic constants to stray into regions of parameter space that produce nonphysical predictions. The use of parameter estimation and nonlinear fitting techniques in conjunction with numerical models allows for greater flexibility by allowing for a variety of experimental boundary and starting conditions. The majority of the defined methods are iterative in nature, necessitating the use of an initial estimate of the unknown parameters to be optimized before proceeding. Multi-objective optimization methods are also used to capture both the underlying dynamics and the main response. Although it is possible to estimate unknown parameters in complex nonlinear differential equation models using experimental or clinical data, doing so is extremely difficult. Consequently, we usually fix some parameter values, either based on literature or personal experience, in order to obtain only parameter estimates that are relevant from clinical or experimental data. When such prior information is not available, it is preferable to derive all of the parameter estimates from data rather than from prior information. In this study, different nonlinear optimization approaches will be compared in order to estimate different biological dynamic parameters in a nonlinear differential equation model.

Keywords : nonlinear dynamics, differential equation models, parameter estimation