

Pendekatan Perturbasi Singular Geometris untuk Model Predator-Prey dengan Carrying Capacity pada Populasi Prey = Geometric Singular Perturbation Approach to Predator-Prey Model with Carrying Capacity for Prey Population

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Abstrak

Pada tesis ini dibahas mengenai sistem predator-prey dengan tingkat kelahiran prey jauh lebih kecil dibandingkan tingkat kematian predator dan mengasumsikan bahwa populasi prey terbatas, sehingga ditambahkan faktor kapasitas lingkungan ke populasi prey. Karena perbedaan rentang waktu regenerasi antara predator dan prey relatif tinggi, sistem memiliki struktur fast-slow. Struktur fast-slow pada model dianalisis dengan menggunakan geometric singular perturbation theory (GSPT) yang membagi sistem menjadi fast subsystem dan slow subsystem. Dalam tesis ini, dipelajari keberadaan solusi ekuilibrium dan stabilitasnya, dan juga perilaku solusi di sekitar critical manifold. Selanjutnya, dengan menggunakan fungsi entry-exit diperoleh hubungan antara solusi fast subsystem dan slow subsystem secara analitis.

.....In this thesis we discuss the predator-prey system with the birth rate of the prey is much smaller compared to the predator mortality rate where it is assumed that the population of prey is limited. Therefore, an environmental carrying capacity factor is added to the prey population. Due to the difference in regeneration's timescales between predator and prey, some solutions of the system may have a fast-slow structure. The fast-slow structure of the model is analyzed using the geometric singular perturbations theory (GSPT) which divides the system into fast and slow subsystem. In this thesis, we study the existence of the equilibrium solutions and their stability, and also the behaviour of the solutions near critical manifold. Furthermore, using an entry-exit function we obtain the connection between the solutions of the slow subsystem and the fast subsystem analytically.