

# Biological systems with bounded random disturbances: the chemostat model with wall growth

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Chemostat refers to a laboratory device used for growing microorganisms in a cultured environment and has been regarded as an idealization of nature to study microbial ecosystems at steady state, which is a really important and interesting problem due to the many applications that can be found in the real life. The simplest chemostat device consists of three interconnected tanks called *feed bottle*, *culture vessel* and *collection vessel*. The nutrient is pumped from the first tank to the culture vessel, where the interactions between the species and the nutrient take place, and there is also another flow being pumped from the culture vessel to the third tank such that the volume of the culture vessel remains constant. Nevertheless, very strong restrictions are supposed in the deterministic model and the use of the white noise in the stochastic case produces drawbacks from the point of view of applications since it is unbounded. Because of this reason, we are really interested in considering random disturbances which are bounded, which have been proved to be very close to the ones in the laboratory.

In this talk, random disturbances in the chemostat model will be analyzed by making use of bounded stochastic processes. Particularly, the existence and uniqueness of global solution will be stated and the existence and uniqueness of an attracting set will be also proved. Thanks to a deeper analysis involving the internal structure of the attracting set, we will be able to provide conditions to ensure the persistence of the microbial biomass, which is also the main goal pursued by biologists. Finally, several simulations will be shown to support the previous results.