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Notion of stability and its applications

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Stability of any kind of states or processes (states depending on time), such as planetary motion, work of mechanical/electronic devices, body health, etc., plays a principal role for in our life.

In general, *stability* of a certain state s of some system means that all states of this system closed to s have “*similar*” properties, whatever this means in a concrete situation. Therefore one should say about stability of *sets of states*. Then a set X of states might be called *stable* if it has the following property: if a state s belongs to X , then any state s' *sufficiently close to s* also belongs to X .

One sees that such a definition resembles the definition of an *open set* in a topological space.

Therefore usually one defines a topology on the set of all states of a given system and then open sets of this topology serve as models for stable sets of states.

The aim of this educational lecture is to review several topological results concerning stability, and describe their applications in life sciences.