Sweeping process and its stability with applications to lattices of elasto-plastic springs

Ivan Gudoshnikov (Institute of Mathematics of the Czech Academy of Sciences)

Abstract. Moreau's sweeping process is a class of non-smooth evolution problems invented to handle one-sided constraints in natural processes involving e.g. elastoplasticity, friction and thresholds in electicity and electomagnetism. The sweeping process can be viewed as a geometric generalization of hysteresis models.

I will discuss its asymptotic properties, especially focusing on the case of a periodic input, as it leads to periodic outputs forming an attracting set.

Another focus will be the stress analysis of lattices of elasto-plastic springs via a finite-dimensional sweeping process (with illustrative examples). The mentioned asymptotic properties lead to nice conclusions about stress trajectories in the lattice models, some of which have their counterpart theorems in the shakedown theory for continuous elastoplastic media.

This is a joint project with Oleg Makarenkov, Dmitry Rachinskiy (University of Texas at Dallas) and Yang Jiao (Arizona State University).