Abstract

Analysis of non-smooth dynamical systems using set-oriented methods demonstrated on an ultrasonic vibro-impact drilling system

Non-smooth dynamical systems appear in many applications, especially in those with contact/non-contact switching or systems with impacts. Non-smooth behaviour may be essential for the function or not desired. In both cases it is important to gain profound knowledge about the dynamical behaviour.

The new and promising set-oriented numerical methods, which are similar to cell-to-cell mapping methods, provide a global determination of the stationary system behaviour, in which they are completed by "classical" methods such as Poincaré maps, bifurcation analysis and stability methods.