

## Directional instability or positive cone-constrained eigenvalues: the mechanical and algebraic faces of a same problem

A. Pinto da Costa

ICIST, DECivil, Instituto Superior Técnico, Universidade de Lisboa  
Avenida Rovisco Pais, 1049–001 Lisboa, Portugal

`antonio.pinto.da.costa@tecnico.ulisboa.pt`

The presentation is dedicated to the mechanical and algebraic aspects of a problem used in the investigation of divergence instabilities in frictional contact systems. This Liapunov type instability corresponds to the existence of smooth non oscillatory exponentially growing dynamic solutions with initial conditions arbitrarily close to the equilibrium or steady sliding state. The ingredients necessary for the onset of such instabilities are primarily “friction”, “stiffness”, “obstacle curvature” and the “distribution of the obstacle normal reactions”, conveniently combined.

The algebraic counterpart to the directional instability problem is a special type of eigenvalue problem: a cone-constrained eigenvalue problem. It is a complementarity eigenvalue problem that has attracted some attention in recent years and has been proved to be linked with the copositivity property of matrices. Its combinatorial character poses obvious challenges.