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Kinematic analysis of Bricard’s mechanism. (English) [Zbl 1247.70003]

Summary: We show how the tools of computational algebra can be used to analyze the configuration space of multibody systems. One advantage of this approach is that the mobility can be computed without using the Jacobian of the system. As an example, we treat thoroughly the well-known Bricard’s mechanism, but the same methods can be applied to a wide class of rigid multibody systems. It turns out that the configuration space of Bricard’s system is a smooth closed curve, which can be explicitly parametrized. Our computations also yield a new formulation of constraints which is better than the original one from the point of view of numerical simulations.

MSC:
70B15 Kinematics of mechanisms and robots
70-08 Computational methods for problems pertaining to mechanics of particles and systems
70E55 Dynamics of multibody systems
13P10 Gröbner bases; other bases for ideals and modules (e.g., Janet and border bases)

Keywords: multibody systems; configuration space; overconstrained linkages; mobility analysis; ideal decomposition; Gröbner bases

Software:
SINGULAR

Full Text: DOI

References: