

The rolling ball problem on the sphere

Laura M. O. Biscolla

Universidade Paulista
Rua Dr. Bacelar, 1212, CEP 04026–002 São Paulo, Brasil
Universidade São Judas Tadeu
Rua Taquari, 546, CEP 03166–000, São Paulo, Brasil
E-mail address: laurabiscolla@terra.com.br

Jaume Llibre

Departament de Matemàtiques, Universitat Autònoma de Barcelona
08193 Bellaterra, Barcelona, Catalonia, Spain
E-mail address: jllibre@mat.uab.cat

Waldyr M. Oliva

CAMGSD, LARSYS, Instituto Superior Técnico, UTL
Av. Rovisco Pais, 1049–0011, Lisbon, Portugal
Departamento de Matemática Aplicada
Instituto de Matemática e Estatística, USP
Rua do Matão, 1010–CEP 05508–900, São Paulo, Brasil
E-mail address: wamoliva@math.ist.utl.pt

Dedicated to Luís Magalhães and Carlos Rocha on the occasion of their 60th birthdays

Abstract. By a sequence of rolling motions without slipping or twisting along arcs of maximal circles outside the surface of a sphere of radius R , a spherical ball of unit radius has to be transferred from an initial state to an arbitrary final state taking into account the orientation of the ball. Assuming $R > 1$ we provide a new and shorter proof of the result of Frenkel and Garcia in [4] that with at most 4 moves we can go from a given initial state to an arbitrary final state. Important cases such as the so called elimination of the spin discrepancy are done with 3 moves only.

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