Abstract

Instead of hill jumps, ski jumpers often perform imitation ski jumps from a fixed surface or moving platforms. The purpose of the present study was to examine the effect of boundary conditions during such jumps. We created two conditions for imitation jumping that are used in practice, jumping from a fixed surface (FIX) and a rolling platform (ROLL). In FIX the jumpers have the possibility to generate shear propulsion forces (friction) in ROLL this option is heavily reduced.

Six ski jumpers of the Norwegian National team performed five jumps in random order under ROLL, FIX conditions. Squat jumps (SQ) from the typical ski jump starting position were used as reference. Both conditions resulted in remarkably similar kinematics (Fig. 1, 2), which was expected as the jumpers are instructed to imitate kinematics they are to produce in the hill. The movements were obtained by clearly different dynamics (Fig 1 and 3) and EMG patterns (Fig 4). The differences are reflected in the way the ground reaction force (GRF) runs with respect to centre of mass (CoM) (Fig. 1 stick diagram). In FIX, GRF briefly, in the middle of push off, runs in front, while in ROLL is runs consistently behind of CoM. This indicates that the control strategies for angular momentum differ between conditions, but this is handled without difficulty by this group of athletes.