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Multi-actuated mechanism design considering structure flexibility using correlated performance reinforcing

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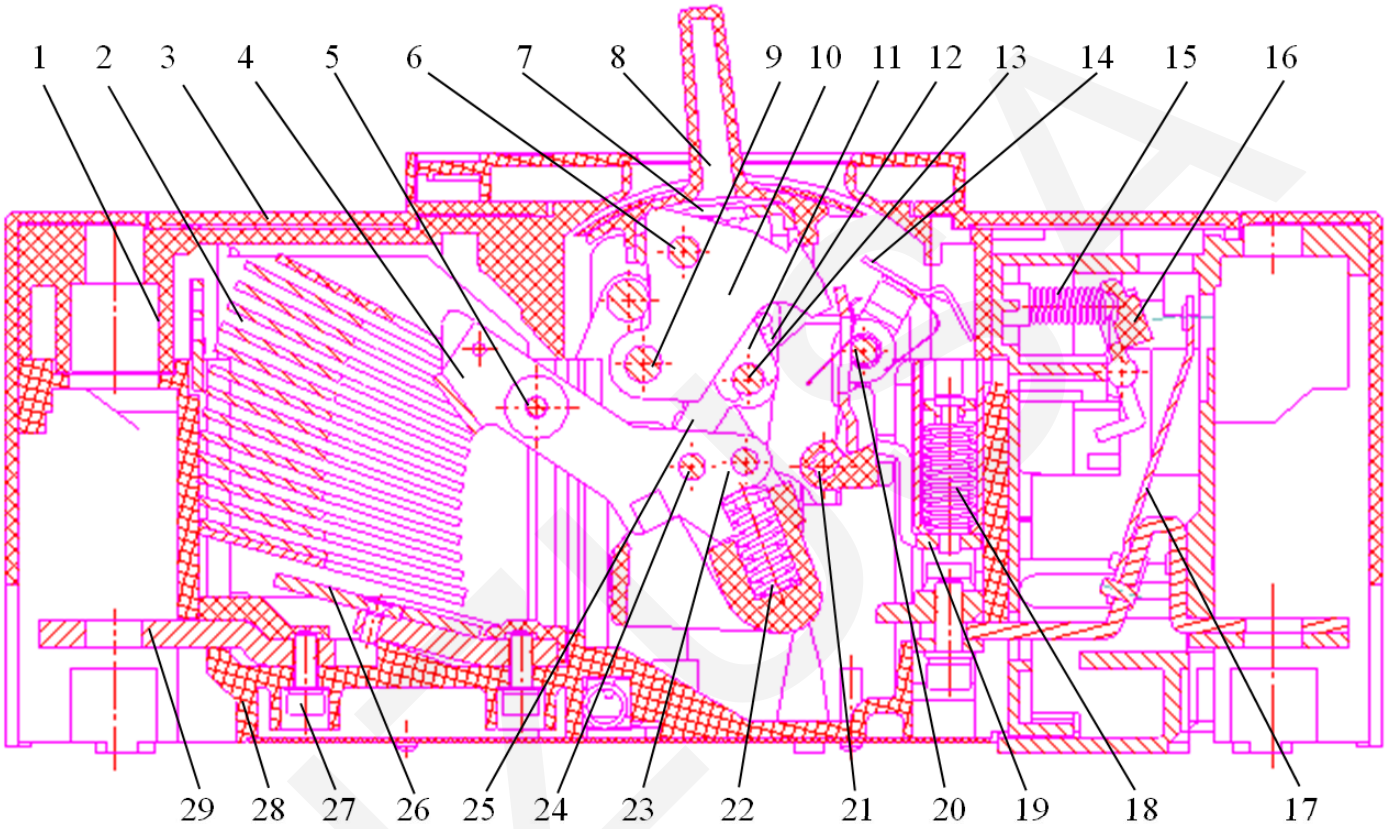
Multi-actuated mechanism



1—Wiring terminal; 2—Deion plates for arc extinguishing; 3—Upper moulded case; 4—Moving contactor K; 5—Fixed joint in moving contactor; 6—Revolute joint D; 7—One end J of main spring JB; 8—Manual Operating Handle JB; 9—Revolute joint C/ Ground; 10—Jump buckle; 11—Upper linkage BD; 12—Revolute joint O/Ground;13—Revolute joint B; 14—High contact joint T/ Latch buckle TH; 15—Drawbar spring; 16—Thermo-pretightening regulator; 17—Cantilevered thermobimetallic strip; 18—Flapped electromagnet armature; 19—Short/long time delay tripping trigger; 20—Revolute joint H/Ground; 21—Instantaneous tripping trigger; 22—Moving contactor spring; 23—Revolute joint R of main shaft/Ground; 24—Revolute joint A; 25—Lower linkage BA; 26—Static contactor; 27—Fastening bolt; 28—Lower moulded case; 29—Conductor terminal.

Fig.2 (a) Cutaway view of rigid-flexible multi-body dynamics mechanism

Multi-actuated mechanism

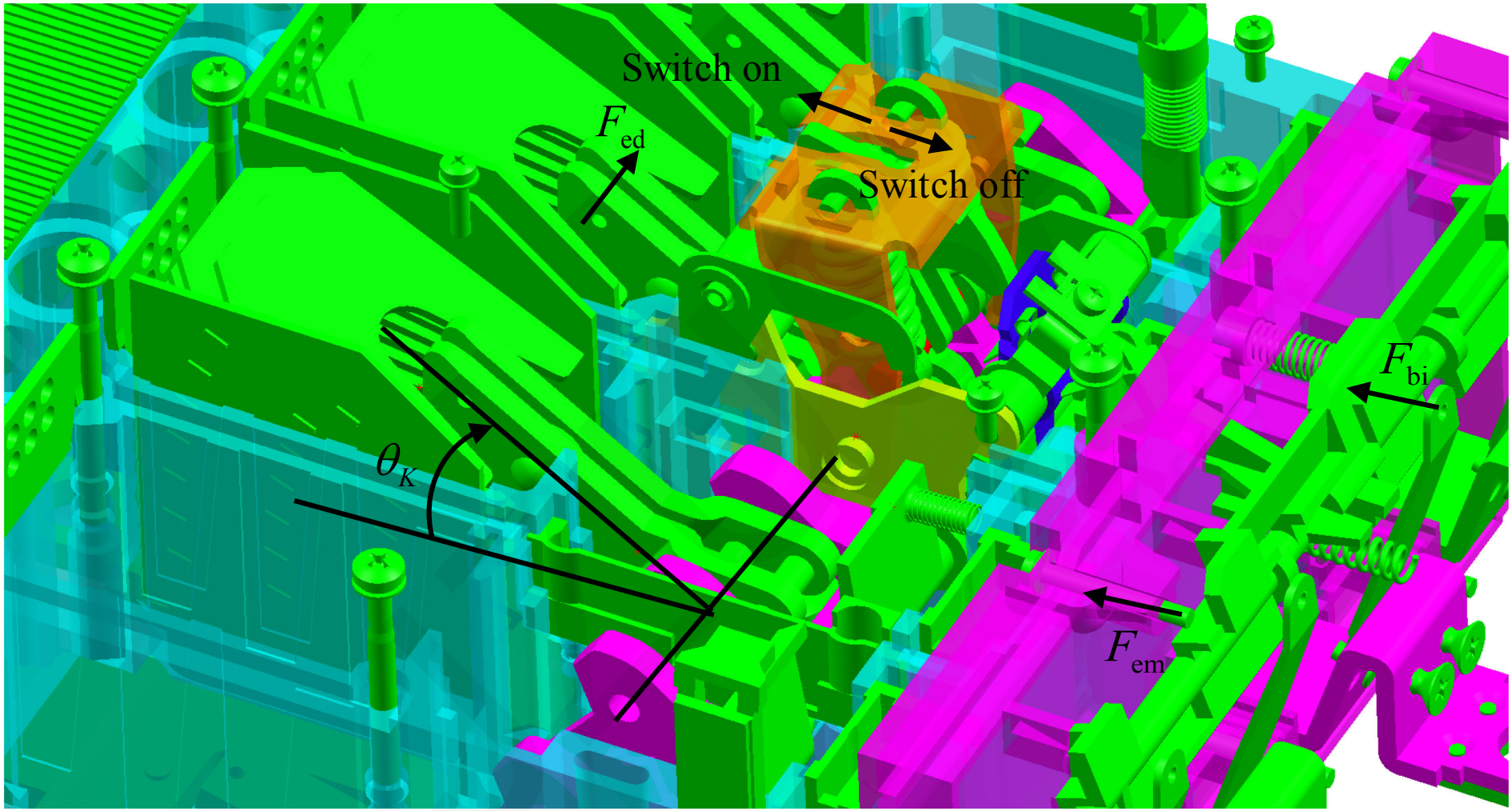
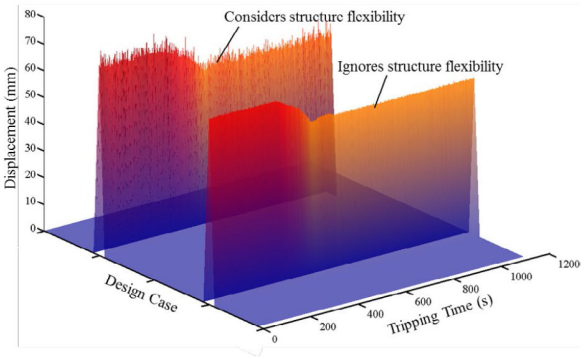
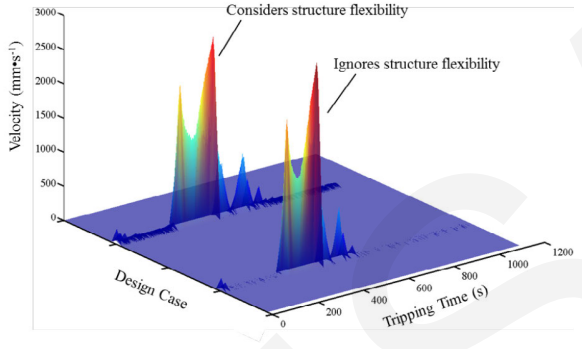


Fig.2 (b) Isometric drawing of rigid-flexible multi-body dynamics mechanism

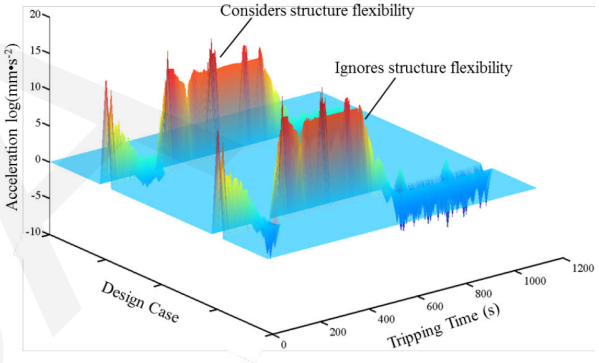
Displacement, velocity, acceleration, force and torque by correlated performance reinforcing



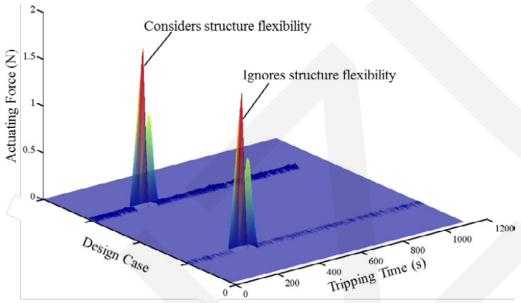
(a) Displacement s_K of moving connector K



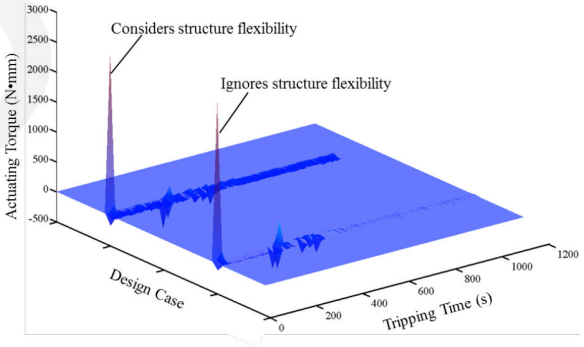
(b) Velocity v_K of moving connector K



(c) Acceleration a_K of moving connector K



(d) Repulsion force F_{ed} on moving connector K



(e) Torque M_K applied to moving connector K

Fig. 4 Displacement, velocity, acceleration, force and torque on *K* by correlated performance reinforcing

Conclusions

- A multi-actuated mechanism design method considering structure flexibility using correlated performance reinforcing is put forward.
- Simulation showed that the structure flexibility can reduce the tripping velocity, which is non-negligible, especially for high frequency tripping.
- The experimental results were in agreement with the simulation results in terms of the relative extent to which the key structures in temperature rising.