

































- [18] L. Birglen. *Analysis and Control of Underactuated Robotic Hands*. PhD thesis, Faculté des sciences et de génie, Université Laval, Québec, Canada, October 2004.
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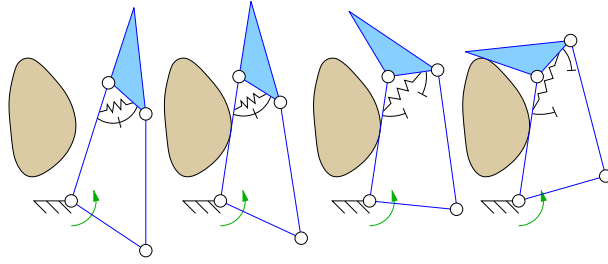


Fig. 1. Closing sequence of a 2-phalanx finger with linkage transmission.

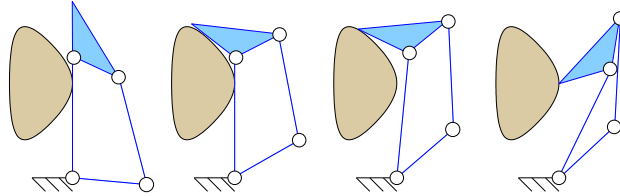
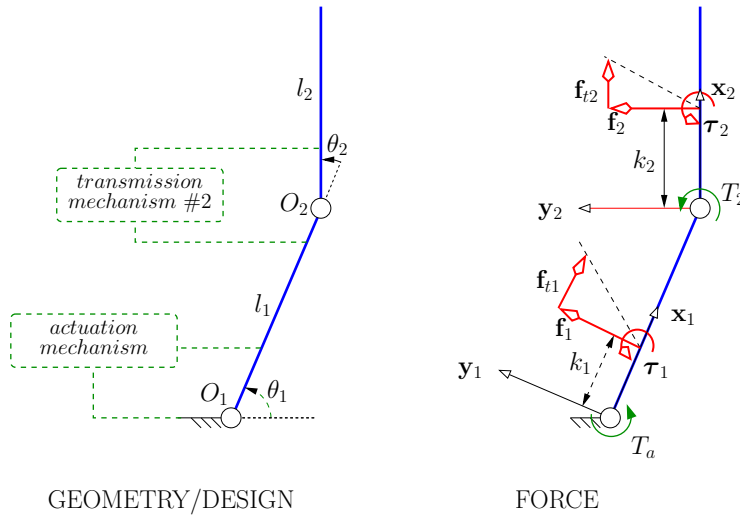


Fig. 2. Example of an ejection sequence.



GEOMETRY/DESIGN

FORCE

Fig. 3. Conceptual two-phalanx underactuated finger.

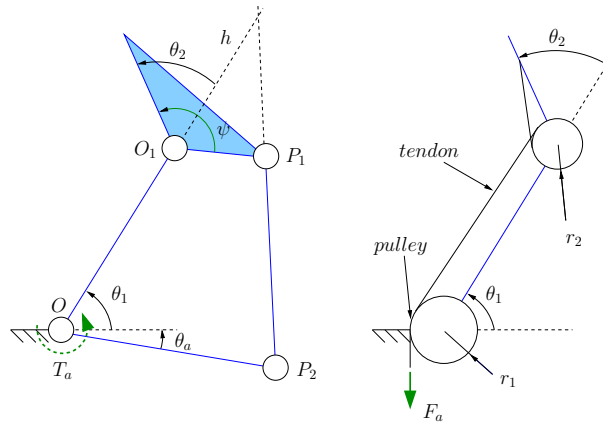


Fig. 4. Common transmission: mechanical linkage and pulley-tendon.

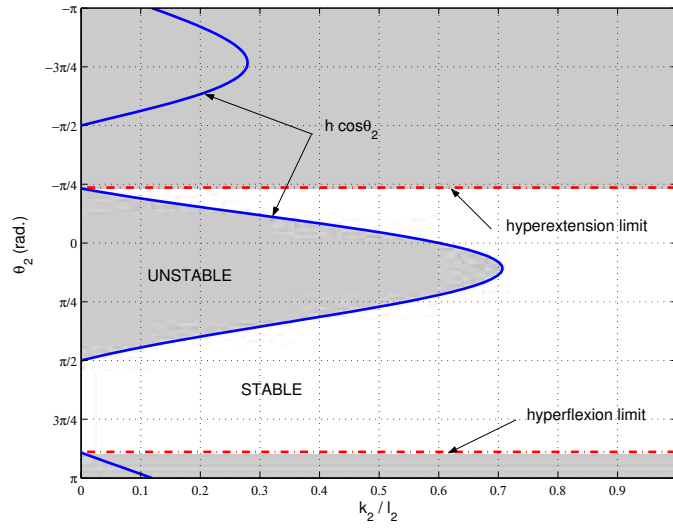


Fig. 5. Grasp-state plane: positive zones for  $\mathbf{f}$  (parameter set 1).

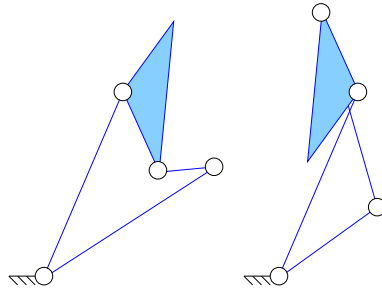


Fig. 6. Hyperextension/hyperflexion configurations.

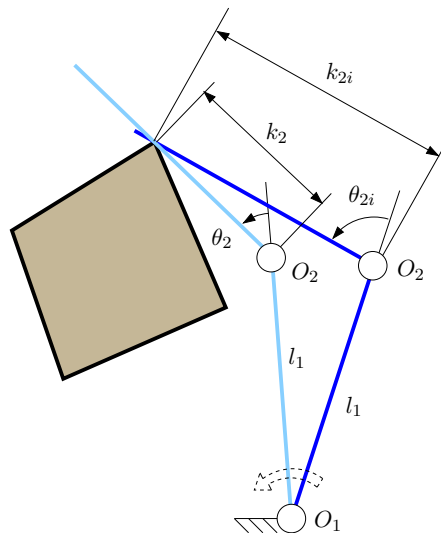


Fig. 7. Grasp-state illustration.

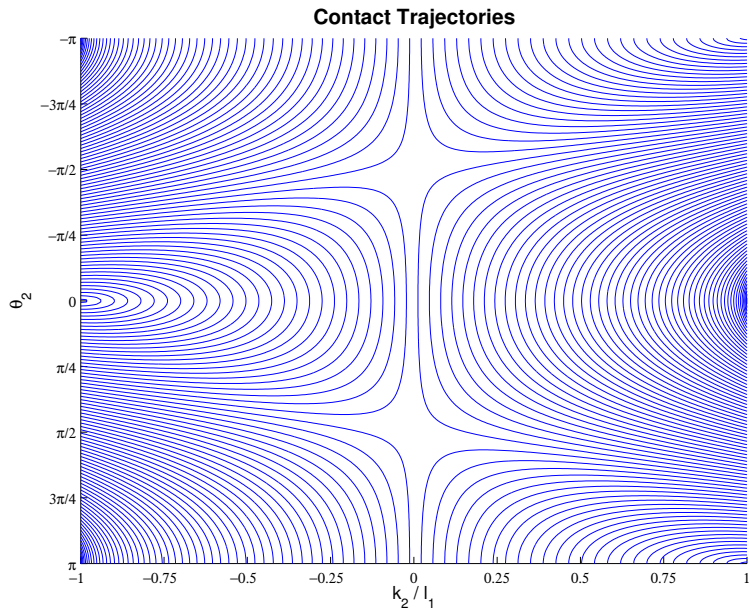


Fig. 8. Contact trajectories in  $(k_2, \theta_2)$ .

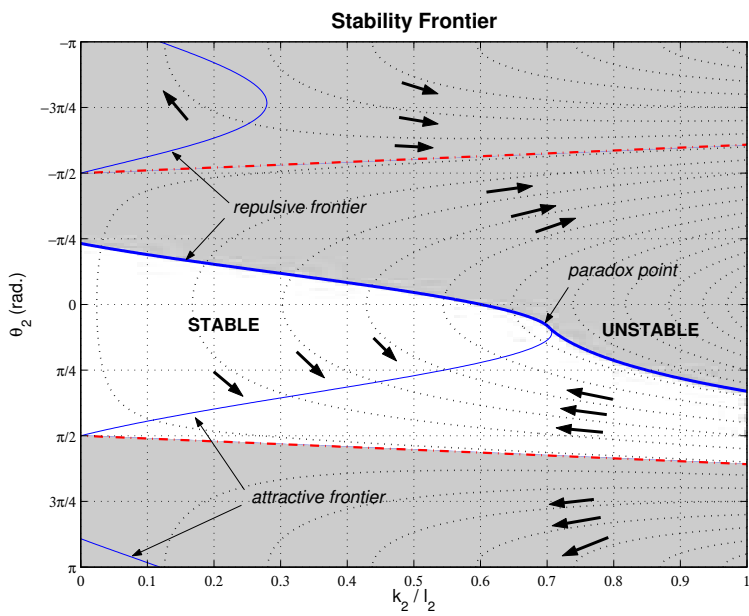


Fig. 9. Final stability of the grasp with one phalanx contact — parameter set 1

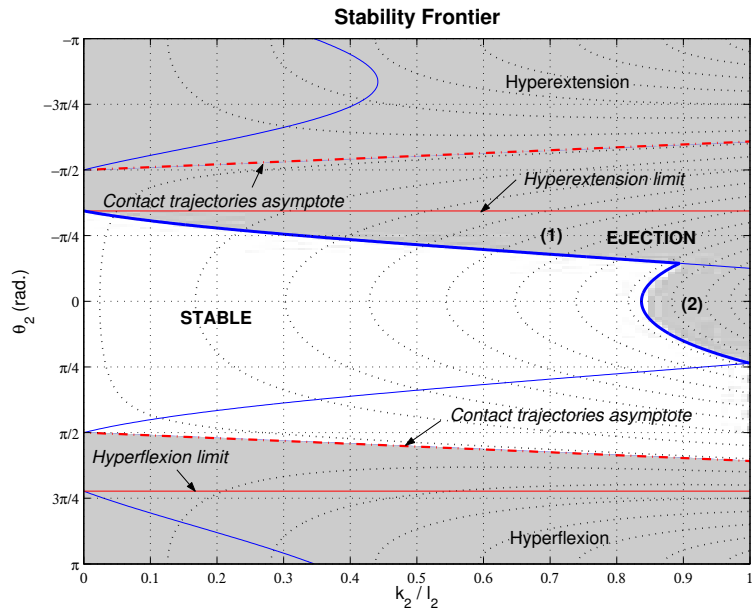


Fig. 10. Final stability of the grasp with one phalanx contact — parameter set 2

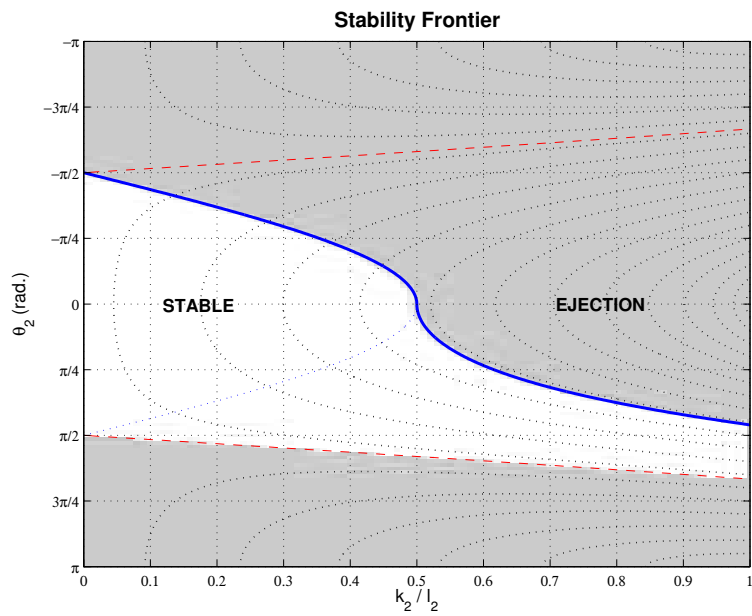


Fig. 11. Final stability of the grasp with one phalanx contact — Soft Gripper

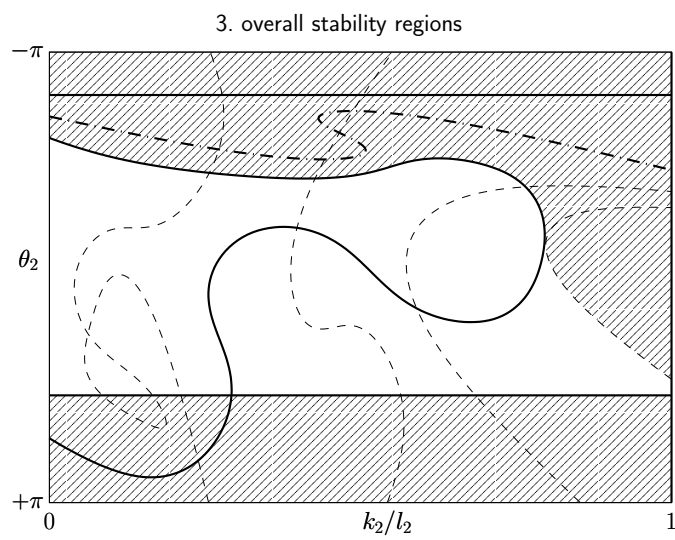
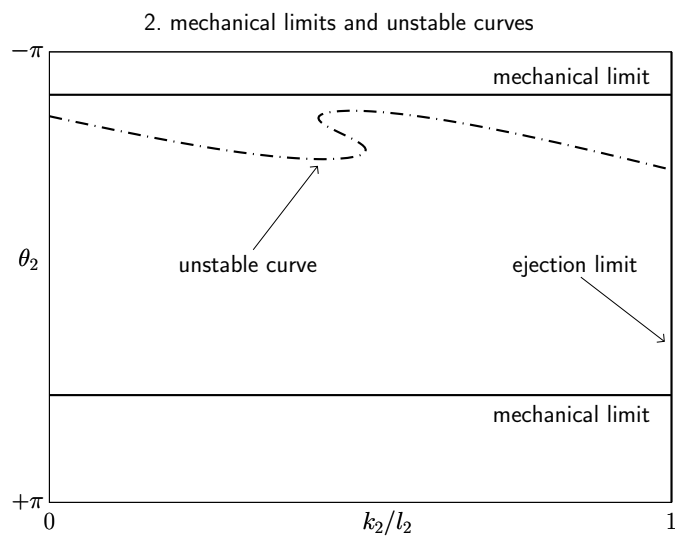
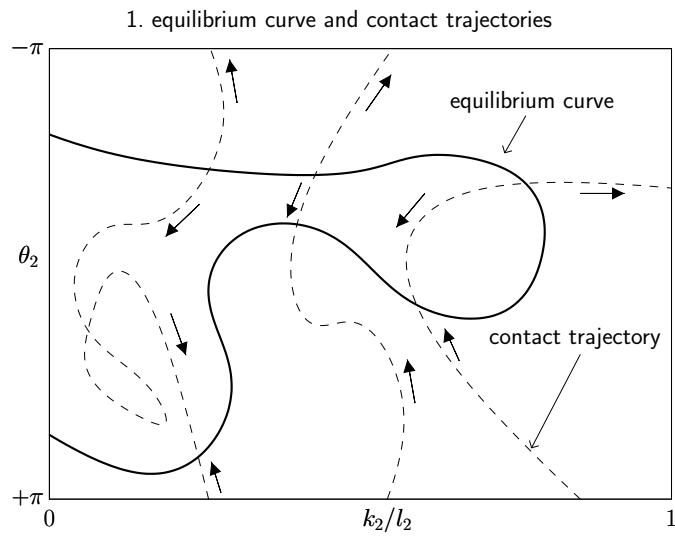


Fig. 12. Construction of the stability regions

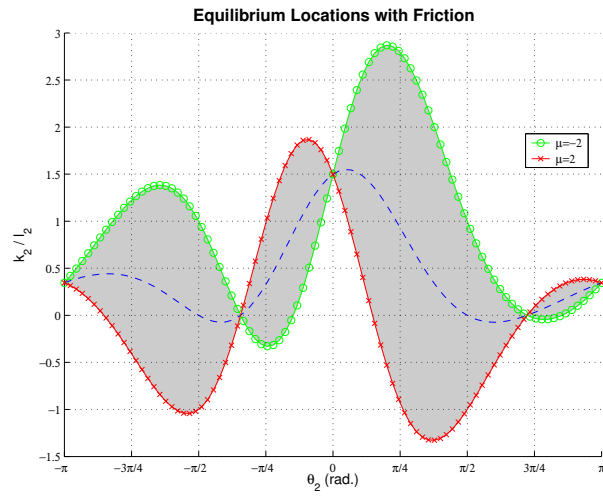


Fig. 13. Stable areas with friction (parameter set 2).

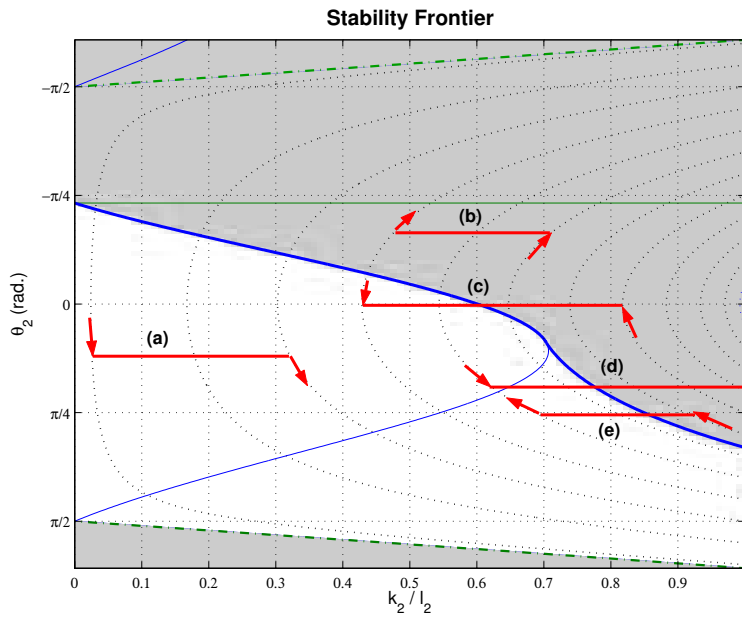


Fig. 14. Linear contact stability (parameter set 1).

Fig. 15. Linear contact stability (parameter set 2).

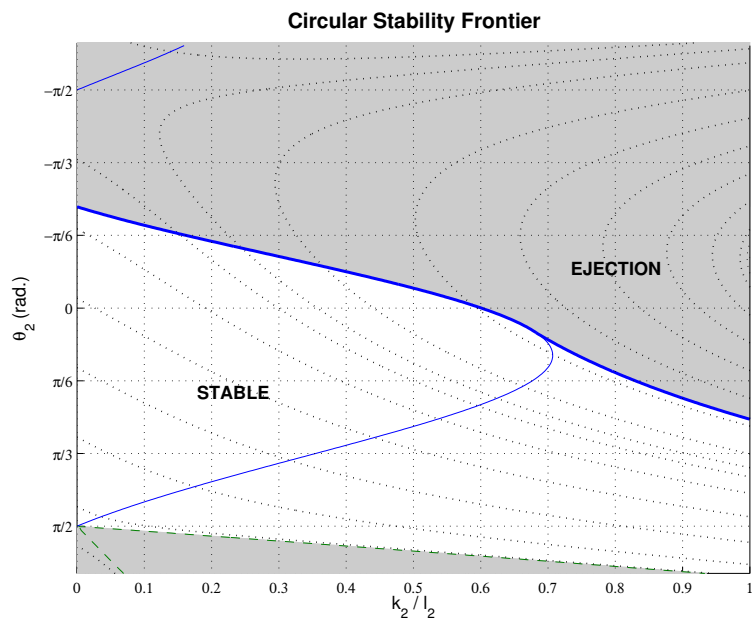


Fig. 16. Stability of the grasp with one phalanx cylindrical contact (parameter set 1,  $R_c = l_1/4$ ).

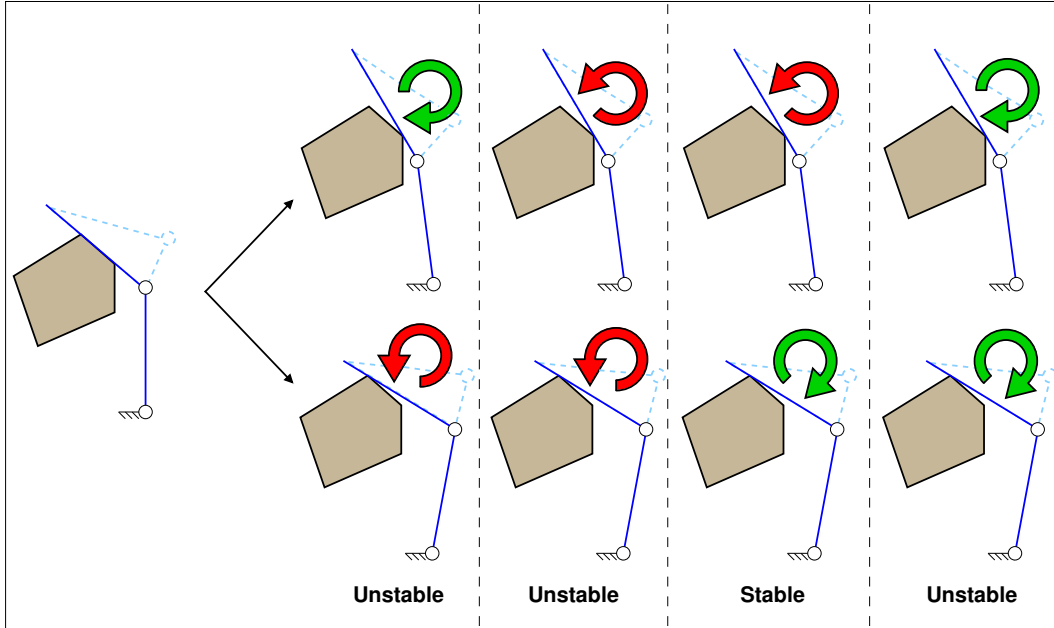
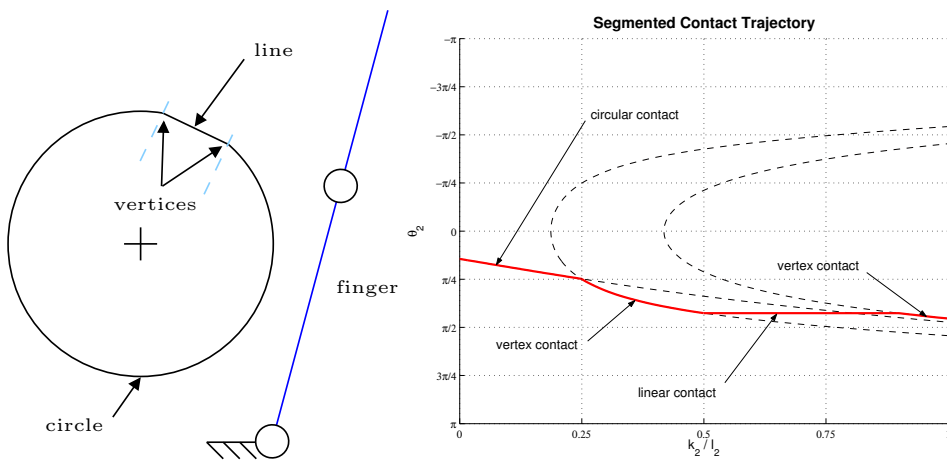


Fig. 17. Stability of the initial linear contact



(a) Cartesian plane

(b) Grasp-state plane

Fig. 18. Segmentation example.