# The strange case of a piecewise smooth elastic structure

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A new type of flutter instability generated by the "fusion" of two structures which are separately stable, but become unstable when joined together. The analysis of instability involves here the treatment of a discontinuity in the curvature of a constraint [1], so that the system is piecewise smooth.
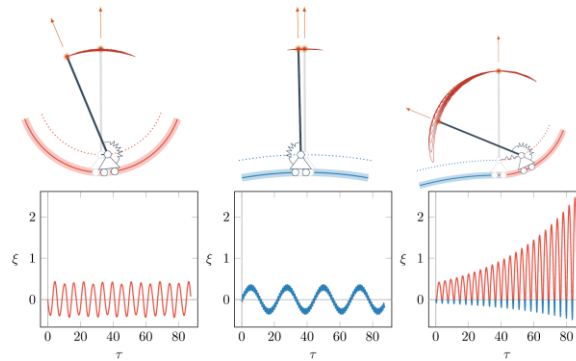
Two stable smooth subsystems with positive and negative curvature of a sliding constraint (upper part: left and centre) and the fusion of these two structures, namely, a compound non-smooth structure displaying instability (upper part: right), although the two 'components' are stable. The tensile force acting at the free end of the rods is tangentially follower and the same for all three structures, lying well below the critical load for instability in the case of the two smooth 'component systems'.

References

[1] Rossi, M., Piccolroaz, A., Bigoni, D. (2023) Fusion of two stable elastic structures resulting in an unstable system. Journal of the Mechanics and Physics of Solids 173, 105201.