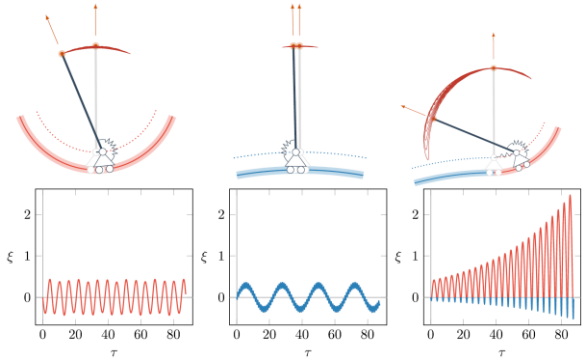
Careful with That Structure, Eugene

Davide Bigoni

Università di Trento
DICAM Via Mesiano 77, 38123 Trento

Flutter instability caused by follower loads has become a reality after the invention of the "freely-rotating wheel device" by Bigoni and Noselli [1], of the "flutter machine" [2, 3], and of the device to generate Reut-type loads [4]. Further research has proven that flutter instability, Hopf bifurcation, dissipation instabilities, and Ziegler paradox are all possible in conservative systems, thus disproving an erroneous belief continuing since at least 50 years [5]. The last part of the talk addresses 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 [6].



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'.

Acknowledgements Financial support is gratefully acknowledged from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (Grant agreement No. ERC-ADG-2021-101052956-BEYOND).

References

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