

Abstract Submitted  
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**Dynamics of compound, compressible flow contractions**<sup>1</sup> JEAN-PIERRE HICKEY, HAMID DARYAN, KHALED YOUNES, University of Waterloo — Sudden axisymmetric flow contractions lead to a local acceleration of the flow which causes large pressure gradients and, ultimately, can cause local flow separation. For a single stream contracting flows, the dynamics of the problem are well understood—even in the turbulent, compressible regime. In compound compressible flows, which are defined by co-flowing, axisymmetric streams, the differential flow acceleration among the streams results in non-negligible radial pressure gradients and varying compressibility effects. This causes non-linear coupling among the dynamics of the co-flowing stream. We investigate the dynamics in the compound, compressible contractions using low-order models and high-fidelity computational fluid dynamics. We show the emergence of a bifurcation point which is governed by the compound flow properties and the geometric features of the contraction. We investigate the sensitivity of the bifurcation point and the dynamics of this highly unstable system.

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