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Stationary spherically symmetric supersonic winds and accretion: from Parker to Bondi and back MARCO VELLI, Jet Propulsion Laboratory, California Institute of Technology — Although we have known the solar wind is supersonic for almost 50 years now, it is little known that the structure of the stationary spherically symmetric solar wind solutions found by Parker is fundamentally connected to the Bondi solutions for spherically symmetric accretion. In this talk I will describe how, for the simpler case of isothermal flows, changes in the relative pressure jump between the coronal base and distant medium produce changes in the resulting stationary flow. The pressure jump between coronal base and interstellar medium (ISM) functions as a control parameter in terms of which stationary flows display a hysteresis-type cycle with two catastrophy points: as the pressure of the ISM increases, the termination shock moves closer towards the coronal base, but when the shock position reaches the critical point, the flow collapses into supersonic accretion with a shock below the critical point. If the pressure of the ISM then decreases again, the flow can evolve continuously into subsonic breeze accretion, but the flow evolves back into a state characterized by a supersonic shocked wind, once the pressure difference corresponding to a static coronal stratification is exceeded. Numerical simulations are shown which confirm this scenario and illustrate the important role boundary conditions play in fluid flows around astrophysical objects.

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