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A stringent limit on the amplitude of Alfvénic perturbations in high-beta low-collisionality plasmas JONATHAN SQUIRE, Caltech, ELIOT QUATAERT, University of California, Berkeley, ALEXANDER SCHEKOCHIHIN, Oxford University — It is shown that low-collisionality plasmas cannot support linearly polarized shear-Alfvén fluctuations above a critical amplitude $\delta B_\perp/B_0 \sim \beta^{-1/2}$, where β is the ratio of thermal to magnetic pressure. Above this cutoff, a developing fluctuation will generate a pressure anisotropy that is sufficient to destabilize itself through the parallel firehose instability. This causes the wave frequency to approach zero, interrupting the fluctuation before any oscillation. The magnetic field lines rapidly relax into a sequence of angular zig-zag structures. Such a restrictive bound on shear-Alfvén-wave amplitudes has far-reaching implications for the physics of magnetized turbulence in the high-β conditions prevalent in many astrophysical plasmas, as well as for the solar wind at $\sim$1AU where $\beta > 1$.

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