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Discovery of Discrete Alfven-Sound Eigenmodes in Tokamaks[1] C. Z. CHENG, GERRIT KRAMER, MARIO PODESTA, RAFFI NAZIKIAN, Princeton Plasma Physics Laboratory — Theoretical and experimental studies have confirmed that the discrete Alfven eigenmodes such as TAEs can be destabilized by fast particles and cause significant fast particle loss in the tokamaks. Most Alfven eigenmodes have frequencies above the lowest TAE continuum. Experiments have also found BAEs with frequencies below the TAE continuum gap. Here we present the discovery of new Alfven-Sound Eigenmodes (ASE) with frequencies below the TAE continuum gap. In finite pressure plasmas slow modes interact with Alfven waves and breaks up the continuous spectrum below the TAE gap to form Alfven-Sound (AS) frequency gaps. Analytical theory of AS gaps will be presented. Using the full MHD NOVA code several new ASEs are discovered to exist with frequencies in the AS gaps without suffering continuum damping. The existence of the ASEs is robust for normal and reversed q-profiles, broad range of plasma beta values and plasma shaping. The stability of ASEs due to fast ions will be presented.

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Chio Cheng
Princeton Plasma Physics Laboratory

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