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The 3D Structure of Flux Tubes That Admit Flute Instability in the Scrape-Off-Layer (SOL) of Tokamaks[1] HIRONORI TAKAHASHI, Princeon Plasma Physics Laboratory — A severe reduction in size down to an ion gyro-radius scale, commonly known as "squeezing," in a lateral dimension of the cross section of a flux tube is traditionally thought to inhibit the occurrence of the flute instability in the Scrape-off-Layer of a diverted tokamak by isolating the main volume of the flux tube from its ends at electrically conducting target plates. A study reported here in the 3D flux tube structure reveals the absence of squeezing for a flux tube that is sufficiently large in its toroidal extent (small toroidal harmonic number n) and located in a layer of low field-line shear around the "sweet spot" (about mid-way between the primary and secondary separatrices). The low-shear layer does not hence inhibit the flute instability through the squeezing mechanism, and may thus restore the flute instability, among the most virulent in the magnetized plasma, to the ranks of candidate electrostatic instabilities thought to underlie the turbulence in the SOL in tokamaks. Variations along the flux tube of geometrical characteristics including the cross section will be calculated to develop criteria for the absence of squeezing.

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