Excitation of a closed current loop in plasma during radial breakdown of a dielectric surface in an axisymmetric geometry

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A closed loop with a current in the plasma is called a compact torus or FRC (Field Reversed Configuration). Tori can be accelerated and compressed by external magnetic fields in thermonuclear colliders and electric rocket engines. A new method for forming compact tori in inductive energy storage devices was proposed. This method demonstrated high efficiency of magnetic energy conversion in the accumulator - up to 70 percent of the stored energy is transferred to the plasmoid, the current reached several tens of kiloamperes with a plasmoid diameter of 30 cm, and its speed was 40 km/sec. Two plasmoids accelerated towards each other produced a plasma temperature of over 1 keV at the collision point and a soft X-ray radiation duration of about one microsecond, which is three orders of magnitude longer than the duration of such radiation in Z,X-pinch and plasma focus installations. This demonstrates the real possibility of implementing inertial nuclear fusion. However, inductive accumulators require current interrupters. In our paper [1], we explained the structure of the current during the explosion of thin conductors with the appearance of striations and closed current turns around the exploding conductor. In continuation of the topic, the formation of a compact torus was shown during an ablation discharge on the surface of dielectrics in an flat axisymmetric geometry on a new installation like plasma focus.

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