Measurements of near surface plasma pressure in conditions relevant to transient events in ITER

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During operations of ITER vacuum chamber armour materials will be irradiated by powerful plasma streams. Thermal loads expected on plasma facing components significantly exceed melting thresholds [1] of materials and can not be achieved on existing tokamaks. To simulate plasma surface interaction in conditions relevant to ITER transient events present work have been done on the pulse plasma gun MTK (TRINITI, Troitsk). The objective of this work is to measure a pressure of a near-surface plasma layer that is being formed under the high intensity plasma load. Pressure sensor capable to work under high intensity thermal end electromagnetic loads have been constructed here. Previously used versions of pressure sensors had certain flaws that resulted in significant errors in measurements. To overcome these flaws a numerical model of pressure sensor have been created. This model made it possible to create a new construction of the pressure sensor. A series of plasma experiments have been performed. Thermal loads on the target varied from q = 3.5 MJ/m^2 to 6 MJ/m^2. Duration of plasma exposure was 20 us. Pressure measured near the target surface reaches 7 bar after 3 us from the start of irradiation and gradually dropped to zero values during next 10–20 us. This result corresponds well with date obtained from other diagnostics.

[1] Pitts R, Bonnin X, Escourbiac F and et al 2019 *Nuclear Materials and Energy* **20** 100696