The main mechanisms for the propagation of shockless thermonuclear burning waves are the electron heat conduction and the nonlocal heating by the charged products of thermonuclear reactions. Such waves were considered in many papers. In a number of works, approximate formulas based on the analysis of the energy balance for the heat conduction equation were obtained. Within the fully hydrodynamic approach, unsteady diverging waves of this type were studied mainly. As far as we know, there is only one work [1] where a stationary shockless wave is obtained, which is most likely due to the specifics of a considered planar point explosion problem for a two-temperature DT plasma (the electron temperature at the initial moment of time is infinite, and the ionic temperature is zero).

This report presents properties of a near-stationary axisymmetric fast shockless wave obtained as a result of edge ignition by a proton beam of a cylindrical shell target, previously compressed to the DT-fuel density of about 100 g/cm$^3$ [2]. The mechanism of wave propagation is nonlocal heating by $\alpha$-particles, which is described by the stationary kinetic equation in the Fokker–Planck approximation. The usual set of physical processes arising during the combustion of targets for controlled inertial synthesis is taken into account.

An approximate formula is derived that relates the slope of the pressure profile in the steady-state wave to the wave velocity and the heating power per unit mass of the fuel near the wave front. The applicability of the formulas relating the pressure and velocity at the Chapman–Jouguet point to the propagation velocity of a strong detonation wave is demonstrated. The effect of DT-plasma radiation on the wave is studied. The problem with artificially high initial temperature is considered as a rough model of plasma heating by high-energy neutrons of DT-reaction.