1 Comparison of thermal and electronic contributions to the phase shift of a probing beam during pumping without strong amplified beam.

The ratio of the thermal and electronic contributions to RIC was found to depend on the powers of the pump and amplified beams. In this section we consider this ratio in the case of a small amplified beam power, so in the limit $P_A \to 0$, without saturation of the population inversion.

Investigation of the thermal and electronic contributions to the phase shift of the fiber was carried out using analytical and numerical method. Coefficients μ_n of equation (??) were numerically calculated by solving equation (??) and then equation (??) was numerically integrated by the predictor-corrector finite-difference method scheme. Calculations showed that, depending on the conditions, thermal or electronic contributions can be the dominant effect.

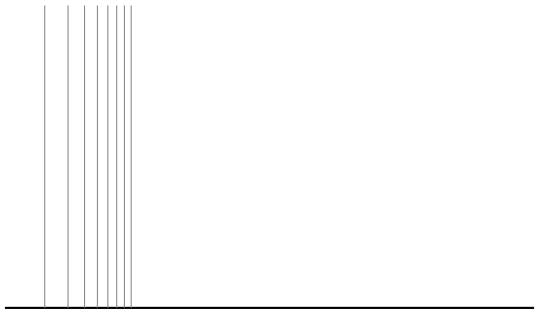

Figure 1: Distribution of refractive index changes (RIC) at $\lambda = 1550\,\text{nm}$ and $z_0 = 20\,\text{cm}$ in the transverse coordinate shown on logarithmic scales. The heat source does not depend on the transverse coordinate (pumping in the clad of 145 mW). Orange curve is the steady-state electronic contribution to RIC, green curve is the thermal contribution to RIC at $t = 0.5\,\text{s}$, and red curve is the steady-state thermal contribution to RIC.