OUTFLOWING ENVELOPES FROM STARS AT ARBITRARY OPTICAL DEPTHS – A NEW APPROACH TO THE PROBLEM

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We have considered a stationary outflowing envelope accelerated by the radiative force in arbitrary optical depth case. Introduced approximations provide satisfactory description of the behavior of the matter flux with partially separated radiation at arbitrary optical depths. The obtained system of differential equations provides a continuous transition of the solution between optically thin and optically thick regions. We analytically derived approximate representation of the solution at the vicinity of the sonic point. Using this representation we numerically integrate the system of equations from the critical point to the infinity. Matching the boundary conditions we obtain solutions describing the problem system of differential equations. The theoretical approach advanced in this work could be useful for self-consistent simulations of massive star evolution with mass loss.

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