Adiabatic profiles in a planet atmosphere with account of a greenhouse gas

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In this work we consider purely analytical model of atmosphere convective layer near the planet surface, stimulated by external short-wave radiation. We take into account both the radiation mechanism of heat transfer in the atmosphere and the heat transfer mechanism due to atmosphere turbulence. Assuming adiabatic temperature profile the problem can be reduced to two ordinary differential equations in terms of the optical thickness of the convective layer. The main parameters determining the adiabatic atmosphere layer thickness are the optical thickness of atmosphere, short-wave radiation flux absorbed by the planet surface, the value of the adiabatic temperature gradient, and the value of the turbulent thermal conductivity. The results of the model can be considered as the ground state of the atmosphere parameters necessary for dynamic analysis, or account of other processes affecting temperature profile formation. The model being applied to the atmosphere parameters gives realistic results.