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In the warm period of the year, the temperature of the exterior surfaces of buildings increases sharply due to irradiation with solar radiation and differs significantly from the outside air temperature. The temperature difference contributes to the formation of convective heat flow directed up the building, resulting in the emergence of the so-called near-surface (boundary) layer of heated air, (Fig. 4) [1,7,9]

The amount of solar radiation and the coefficient of solar radiation absorption by the material of the outer surface of the enclosing structures creates a temperature difference between the external surface of the building and the surrounding air.

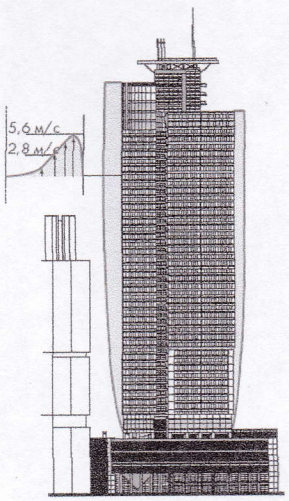

Fig. 4 An example of the velocity profile of ascending air currents at the outer surface of a high-rise building due to the effect of a temperature difference Dt = 20°C.

2 Materials and Methods

The analysis and the study of the Moscow City International Business Center revealed that compactly located towers have transformed the wind regime of the area. The rapidly developing transport and engineering infrastructure seriously exacerbates the environmental situation. Due to the density of the high-rise buildings, the Moscow City Business Center and the intensity of transport communication on the territory, there appeared extensive stable zones with stagnation of the air, where wind speeds range from 0 to 1 m/s. Thus, the territory of the Moscow City Business Center has created its own local climate, with its specific microclimatic conditions on its streets and squares. This microclimate is determined by high-rise urban development. According to our research, the formation of local microclimatic conditions is facilitated by a change in the height of buildings, air temperature and wind speed.

Using the example of the Evolution Tower, the calculation of the temperature of the outside air, atmospheric pressure and wind speed depending on the height of the building has been made.

The variation in the outside air temperature and atmospheric pressure depending on the building height can be determined by the following formulas [3]:

$$t_h = t_0 - 0{,}0065 \times h, ^0C \qquad (2.1)$$