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Correction the temperature magnitudes from IR camera depending on the angle of aspect and the object distance

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IR cameras which are the simple and demonstrative instrument for the representation of the spatial distribution of the temperature field close the surface of investigated object require correct tuning and correct interpretation of the obtained results (the thermogrammes). But the full tuning the parameters of the environment (humidity, air and ambient temperature) and the investigated object (reference temperature, emissivity, the distance to the object…) cannot provide us the correct temperature definition in the every point of the thermogramme. Even the software enclosed with the camera does not let to define the absolute temperature magnitude with desirable accuracy.

It seems that the most considerable perturbations of temperature field in typical practice situations occurs as a result of the dependence on the angle of aspect and the object distance.

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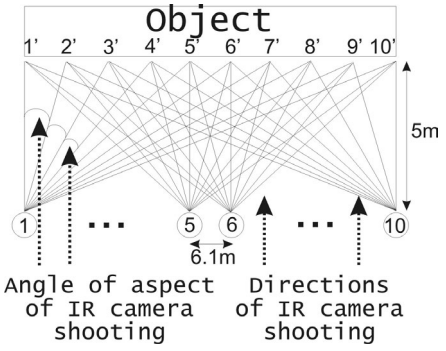

Fig.1. The scheme of the experiment

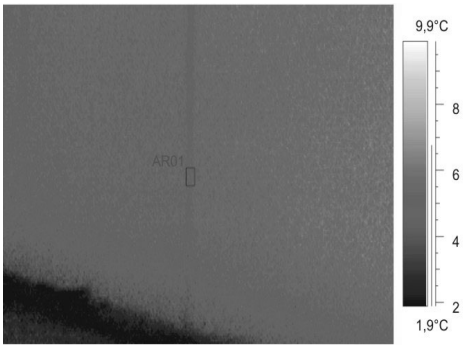

Fig.2. Typical temperature field distribution along the surface of the massive wall

The scheme of the experiment for finding the desirable dependencies is represented in figure1. The object for the experiment is the massive walls with the homogeneous spatial distribution of the temperature field along the surface (Fig.2). From given point (for example, point 5 in fig.1) it has been IR camera shooting the fragment of the wall perpendicular to the wall (point 5') and at the fixed angles (points 1'-4' и 6'-10'). Further it has been IR camera shooting the fragment of the wall from another point (6') such way and so on. The final magnitude of the temperature at fixed point is the average magnitude of temperature integrated by fixed small massive of points close investigated fragment of the wall. At every new shooting the fragment of the wall is located at the same height, the environment conditions and IR camera tunings were the same. These experiments were made using Agema Thermovision 550 camera.

The dependence the error in the definition of the temperature from object distance and the object distance is represented in figure 3 and 4. The most correct is temperature magnitude with the minimum object distance and perpendicular to the wall during IR shooting. This temperature magnitude

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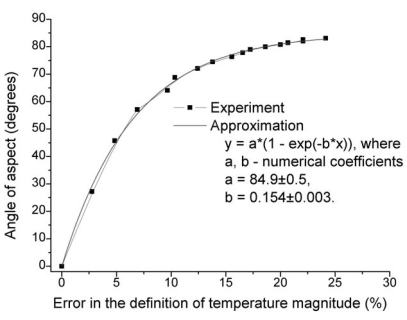
coincides with the well accuracy with the results of the precise temperature sensors at the same point of the object.



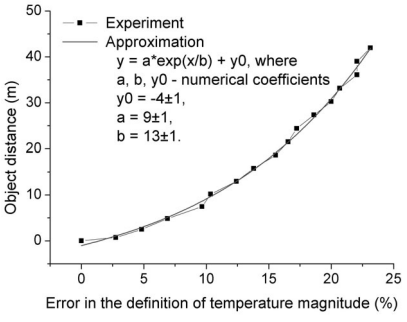


Fig.4. Dependence the error in the definition of the temperature from the angle of aspect

So the experimental dependence the error in the definition of the temperature from object distance and the object distance is approximated with the good accuracy by different exponential functions (see insets in figure 3 and 4). Therefore it is necessary to correct the temperature magnitude at the given point of the object even in the borders of the one thermogramm.

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