AN ESTIMATE OF A SOLAR PROBE PROTECTION FROM INTENSE RADIATION WITH THE USE OF PARTICLES EMBEDDED IN AN ABLATING MATERIAL

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ABSTRACT. An effect of shielding of an intense solar radiation towards a solar probe with the use of micron-sized particles generated during ablation of a special composite thermal protection material is estimated on the basis of a solution to the simplified heat transfer problem. A computational model takes into account not only the radiative transfer in a particle cloud but also heating and evaporation of particles. The spectral radiative properties of molten aluminum oxide are used in the case study. The calculations indicate that the use of oxide additives in a thermal protection and the resulting generation of a cloud of molten particles can be considered as a promising way to protect the solar probe from the intense thermal irradiation at extremely small distances of the probe from the solar photosphere.