ALL-SKY DISTRIBUTION OF THE ZODIACAL THERMAL EMISSION

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In order to establish a theoretical basis for correcting the on-coming IR all-sky survey observations by the IRIS on board ASTRO-F, we have calculated theoretically the brightness of thermal emission from interplanetary dust (IPD) and constructed all-sky maps of the zodiacal emission at several infrared wavelengths. We first analysed the fine resolution distribution of the optical zodiacal light (ZL), which was obtained very recently by Kwon et al. (2000). The results show that the cosine type is the best one, out of the three optical models, for describing the heliocentric latitude dependence of the IPD density $n(\vec{r})$. In the fine resolution map of the ZL brightness, the Gegenschein peak and the morning side ZL cone are shifted slightly to the southward of ecliptic plane, which helped us to locate the symmetry plane at inclination $i \simeq 2^{o}$ and longitude of ascending node $\Omega \simeq 80^{o}$. The inclination deduced from the IRAS observations of the zodiacal thermal emission agrees very well with its optical value. The ascending node of the plane determined from the IRAS annual variation of the peak offset latitude is at $\Omega \simeq 50^{o}$; while that of the pole brightness difference gives us $\Omega \simeq 100^{o}$. Both the opitcal scattering by and the thermal emission from the IPDs have thus confirmed our view of the zodiacal dust cloud to be basically correct. By analysing the IRAS observations we also found best parameters for the heliocentric variations of temperature and mean volumetric absorption cross-section of the IPDs. Employing the cosine model for $n(\vec{r})$ and the deduced parameters for the symmetry plane and the IPD temperature, we have calculated the brightness values at given IR wavelengths as functions of the ecliptic latitude β and the longitude $\lambda - \lambda_{\odot}$ with respect to the Sun. On the basis of the resulting all-sky brightness maps we may correct the zodiacal emission in the IRIS observations over a wide spectral range. We will further refine the model sky maps by incorporating such local inhomogeneities as the IRAS dust bands and the mean motion resonance features in the Earth orbit.