Radiation pressure force acting on cometary aggregates

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The dynamics of cometary dust in the outer coma and in the tail is strongly influenced by the radiation pressure force. Gas and dust are released from the nucleus and observed in the coma, the tails and possibly in meteoroid streams. In the vicinity of the comet the motion of the dust particles is influenced by the radiation pressure force as well as by the gas component. At larger distances from the comet nucleus the influence of the gas component on the dust particles is negligible compared to the radiation pressure. The radiation pressure force causes a deviation of the dust orbits from those of the parent bodies and induces a relative velocity within the dust component. Most studies of dust distribution in the vicinity of comets are based on radiation pressure force derived for spherical compact particles which does not agree with the often used assumption that the cometary dust is porous. Cometary dust particles are assumed to show an aggregate structure where the constituent monomers have sizes in submicron range mostly of about 0.1micron in radius. Model calculations to determine the influence of radiation pressure force were previously carried out for spherical compact grains as well as for small aggregates or aggregates consisting of smaller monomers.

We here present model calculations of the radiation pressure force on aggregates varying material composition, structure and size resembling the cometary dust model. We discuss consequences for the dust distribution in the vicinity of the comets as well as in meteoroid streams.