

Momentum transfer from solar wind to fluffy dust aggregates

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We calculate the momentum transfer cross section of the fluffy dust aggregate for the impinging solar wind taking into account the penetration of incident solar wind ions. We find that 1)the cross section of very small aggregates is approximately proportional to the volume of the grains and independent of their shape, while 2)the cross section of large aggregates approaches the geometrical cross section. Discussion is given on the falling time of the dust into the Sun and young main sequence stars due to the plasma and photon Poynting-Robertson effect. We show that the plasma Poynting-Robertson effect is comparable to the photon Poynting-Robertson effect for the aggregates around the Sun and dominates the photon P-R effect by orders of magnitude for the dust around young main sequence stars. This contradicts the general understanding that the falling time of the dust is mainly limited by the photon Poynting-Robertson effect.