Dust behavior and planetesimal formation in the protoplanetary disks

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Dust began to grow and settle down to the midplane of a protoplanetry disk, when the disk evolved to the passive-disk stage. Dust with radiuses larger than about 1cm, however, will fall to the central star by the effect of differential rotaion between dust and gas and is hard to grow up to planetesimals. On the other hand, dust with radiuses smaller than about 1cm was considerd hard to settle down to the layer thin enough to bring forth the self-gravitational instability because of self-excited turbulence. I propose a new model which may solve the above problems: dust outward drift by radiation pressure in gas may enable dust recycling, and dust-settling simulations show that shear-induced turbulence may be suppressed due to vertical-density structures of infalling dust.