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Charging and coagulation processes in Titan tholin haze as inferred from Huygens/DISR spectrophotometry data

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We present a 1-D microphysical model of the aerosols in Titan atmosphere taking into account photochemical production, collisional and photoelectric charging, coagulation, sedimentation and eddy mixing on the tholin particles. The model output, including vertical and size distribution of tholin nanoparticles (monomers), fractal agregates, and subaggregates composing the internal structure of those aggregates, has been employed to obtain optical properties of the simulated haze, suitable for comparison with observational data. It is shown that nearly uniform vertical distribution of particles, their sizes and internal structure constrained by data of different channels of DISR spectral radiometer onboard Huygens lander, could be reproduced under assumption that particles are formed during Brownian coagulation controlled by electrostatic repulsion. A remarkably constant mean monomer radius, which varies within $0.05 - 0.06\mu$m, may result from the damping of Brownian coagulation of smaller particles by Coulombian potential created by a single elementary charge.