It is highly probable that the formation of the regular satellite systems of Jupiter and Saturn arose from accretion disks of gas and dust surrounding the planets, residual of the last phases of growth of the central body (Ward, 1976; Ruskol, 1980; Coradini et al., 1981; Weidenschilling, 1981). Due to thermal processes (thermal escape of gas) and dynamical ones (energy dissipation by shear viscosity) the disk, when the accretion phase ends, evolves and dissipates itself in a timescale that has to be slow enough to allow satellite formation. We have here studied the evolution of a Jovian disk taking into account only the second dissipative process and considering the effect of a time dependent, attenuating mass accretion and the influence of turbulent regimes.

The gas captured by the sphere of influence of the planet, infalling on the disk, has nearly sonic or supersonic velocities at least as far as the region of the regular satellites, and the Reynolds number is always very high; this should assure the presence of turbulence ("high turbulence"). At the same time, it seems difficult that turbulence can survive to the accretion phase, firstly because it is extremely difficult to explain satellite formation in a disk completely governed by shear induced turbulence, and because the vertical distribution of gas and the Richardson number, well over the minimum stability limit, point out that turbulence cannot self sustain (Weidenschilling, 1980; Iroshnikov, 1980). Anyway, a residual turbulence ("low turbulence") can be driven by friction between gas and solid particles (Weidenschilling, 1980), with turbulent shear viscosity lower for many orders of magnitude.

If it is assumed that the angular momentum of the gas entering in the sphere of influence is determined by the difference between Keplerian and gas rotation velocities around the Sun, it can be that the gas distributes on the whole disk, so that it cannot be here used the usual models of accretion at the rim of the disk. The equations governing the evolution of the disk are, following the Lynden-Bell and Pringle (1974) notation:

\[
\frac{2}{3} \frac{\partial}{\partial t} \left( \frac{g}{r} \right) = - \frac{\partial h}{\partial r} \frac{\partial F}{\partial h} + \dot{m}
\]

\[
F + 2 \frac{\partial}{\partial t} \left( \frac{g}{r} \frac{\partial \nu}{\partial h} \right) = - \frac{\partial q}{\partial h}
\]
Here \( g \) is the shear couple, \( \Omega \) is the Keplerian angular velocity, \( F(r,t) \) the mass flux, \( h(r) \) the specific angular momentum, \( \dot{m}(r,t)/2\pi r \) the infalling mass of gas per sec and per cm\(^2\), and \( \nu \) is the kinematic viscosity, that in turbulent regimes can be expressed as a function of \( h \) and \( g \) only. These equations have been integrated numerically for various disk evolutive models, according this scenario: 1) an initial highly turbulent accretion, with timescales of variation of \( \dot{m} \) much less than the characteristic relaxation time of the disk \( \tau_c \sim h/2\nu \); 2) exponential decay of \( m \) in "high turbulence" regime; 3) sudden decay of turbulence \( (\tau_c \ll \tau) \), drop of the kinematic viscosity and "low turbulence" regime, with large evolutive times.

In Figg. 1 and 2 are reported some preliminary results for a Jovian disk with a mass of \( 2 \times 10^{29} \) g; in Fig.1 is represented the surface density, compared with the one inferred from the actual mass distribution of the regular satellites; Fig.2 shows the total disk mass and the temperature at ten Jupiter radii; here the accretion decay time is of \( 10^2 \) yr, and the total accretion time is of \( 10^3 \) yr. We can argue that with a reasonable choice of the parameters the "experimental" mass distribution can be quite accurately reproduced; however, the problem is to make the long ( \( 10^6 \) yr) total evolutive times compatible with the timescales of formation of the satellites (few years, see Coradini et al., 1981).

**REFERENCES**