

# **Planet formation theory: planetesimal formation in rheological flow**

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## **Abstract**

The paper presents the study of linear dynamics of protoplanetary disks taking into account rheological properties of the flow. Dynamics of dust particles is studied within the granular rheological viscosity model, when kinematic viscosity of the flow depends on the pressure, as well as the velocity shear of the flow. Dynamics of spiral density waves is studied within the described approximation. Linear spiral rheological instability is found: instability growth rate increases with the growth of disk radial stratification parameters. Instability develops for spiral waves rotating opposite to the disk rotation. The process may lead to accelerated formation of planetesimals at early stages of planet formation in protoplanetary disks.