# Dislocation Dynamics Simulations of Creep of Superalloy Single Crystals

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Nickel-based superalloys are precipitate hardening materials with large precipitate volume fraction. The matrix channel of this material is rather narrow. When the deformation mechanism is dominated by dislocation loop expanding in the matrix channel, the dislocation density evolution law and as a direct result the average flowing and hardening laws will be different comparing with normal engineering materials. A 2D discrete dislocation dynamics has been used to study the dislocation loop multiplication and annihilation for this material with considering vacancy diffusion. This project aims at rationalize experimental observed dislocation patterns and supply physical constitutive laws for continuum crystal plasticity framework.