

## CONTINUUM-DISCONTINUUM PARTICLE METHOD

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A new numerical method called Continuum-Discontinuum Particle Method(CDPM) is proposed. This method is a continuum-discontinuum coupled method based on time-dependent explicit iteration. It is a combination of particle system and sub-domain system which are established by the initial nodes and mesh. A particle is formed of a node. A sub-domain consists of all the elements associated with the particle. At the very beginning, the whole field is continuous. Under given strength criterion, the particles and sub-domains can be divided into new ones with new mass and boundaries according to the crack surface, when exceeding the strength. The newborn crack surface and boundaries will be detected and calculated with contact and friction during the computational procedure.

Dynamic equation for a particle and associate sub-domain in CDPM is derived from the Lagrange equation, which is a unification of expression for continuous system and discrete system. The whole field resolution is calculated with dynamic relaxation(Day, 1965; Dang and Meguid, 2010).

CDPM has combined the advantages of finite element method (Zienkiewicz and Taylor, 2005), discrete element method(Cundall and Hart, 1992) and particle-in cell method(Harlow, 1964), which can be widely used in highly nonlinear, dynamic and fracture problems.

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