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Code Optimization for Phase Field Method

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The Phase field model method for studying grain dislocation at atomic level after applying an external force to the materials being tested, enables simulate the behavior of different materials after applying stress. With the appropriate numerical method the simulation could change drastically the complexity of the algorithm. Finding the most accurate and stable numerical method for the phase field model give us a considerable improving in the performance of the code used to simulate the phase field dynamic dislocation in larger and more complex simulations can be performed. We made an statistic comparison between the different methods, comparing stability and convergence, testing the most optimal configuration for the best performance achievable with our particular conditions of the problem. The Multi Step Numerical method algorithm seems to be the most promising method in our particular conditions, the fast convergence and big stability. Currently a big challenge is the development new models and computer algorithms with better overall performance allowing to efficiently use multiple processors, with the help of improvement for large data simulations.