Research Proposal for SURGE 2021

Modeling subsurface mine detonation

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The world is polluted with an estimated 45-50 million mines in over 60 countries; which makes neutralization of landmines very crucial. Current practices of the same centre on manual demining, a slow, labour intensive, and often a high risk and expensive process. Mechanised flail systems are often proposed to speed up the process, reduce the cost, and the risk associated with the neutralization of buried pressure activated landmines.

Our aim here is to model a flail system to detect and neutralise mines (to trigger and detonate mines where buried). When a flail hits the ground with force the impact causes subsurface mines to detonate. For proper design it is necessary to know the minimum force that the flail must transmit to the ground for a given soil type to ensure detonation. As a part of the project, we will be analysing the transfer of stresses from the point of impact of the flail to the location of the buried mine, and see how this varies for different types of soils. This will require a study of how waves transmit in discrete media like soils. For this, we will be using the LAMMPS (Large scale Atomic/Molecular Massively Parallel Simulator) software.