

## Superconducting mesh

Consider a mesh made from a flat superconducting sheet by drilling a dense grid of small holes into it. Initially the sheet is in a non-superconducting state, and a magnetic dipole of dipole moment  $m$  is at a distance  $a$  from the mesh pointing perpendicularly towards the mesh. Now the mesh is cooled so that it becomes superconducting. Next, the dipole is displaced perpendicularly to the surface of the mesh so that its new distance from the mesh is  $b$ . Find the force between the mesh and the dipole. The pitch of the grid of holes is much smaller than both  $a$  and  $b$ , and the linear size of the sheet is much larger than both  $a$  and  $b$ .