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Vortex dynamics simulation in high-T_c superconductors with planar pinning arrays coexisting with point pinning sites HIDEHIRO ASAI, SATOSHI WATANABE, University of Tokyo — The enhancement of critical currents J_c by introducing artificial pinning sites is key issue in the application of high-T_c superconductors. Planar defects such as twin boundary are well known as the possible candidates for tangible pinning sites. Recently, the improvement of J_c has been reported in the samples having high-density planar defects. However, the pinning characteristics of planar defects, especially the change of the pinning efficiency in the presence of point pinning, are still unclear. We have studied the dynamics of vortices interacting with both planar pinning and point pinning sites using molecular dynamics simulation. We have fixed the pinning strength of planar pinning, and calculated the J_c as a function of the point pinning strength f_p. With increasing f_p, J_c changes from $J_c \fallingdotseq J_{pl}$ (J_{pl}: J_c obtained in the system without point pinning) to $J_c \fallingdotseq J_p + \alpha$, ($J_p$: J_c obtained in the system without planar pinning) and then to $J_c \fallingdotseq J_p$. This behavior corresponds to the appearance of the kink structure and the drastic change of c-axis correlation function of the vortices. We have also performed the similar calculation with different anisotropy parameters and observed that the stiffness of vortex line changes the J_c behavior as a function of f_p.

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