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Magnetic Domain Walls Induced by Twin Boundaries in Low Doped Fe-pnictides[1] BO LI, JIAN LI, KEVIN BASSLER, C.S. TING, Univ of Houston — Inspired by experimental observations of the enhancement of superconductivity at the twin-boundary (TB) in slightly electron doped $Ba(Ca)(FeAs)_2$ where a strong 2×1 antiferromagnetic (AF) collinear order is in presence, we investigate theoretically the effects of TBs on the complex interplay between magnetism and superconductivity using a minimum phenomenological two-orbital model. The spatial distributions of the magnetic, superconducting and charge density orders near two different types of TBs are calculated. Each of the TBs has two different orientations. We find that the first type TBs, which corresponds to a 90° lattice rotation in the $a-b$ plane, enable magnetic domain walls (DWs) to be pinned at them, and that superconductivity is enhanced at such TBs or DWs. This result is consistent with experiments for a TB with an orientation of 45° from the x-axis. Contrastingly, we predict that superconductivity is suppressed at the second type of TBs which correspond to an asymmetrical placement of As atoms on the opposite sides of the TB. Furthermore, the lattice-mismatch effect across the TBs is investigated. The comparison of our results with the observations from the nuclear-magnetic-resonance (NMR) experiments is also discussed.

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