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$B \to \pi\ell\nu$ form factors and $|V_{ub}|$ with Möbius domain wall fermions

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We report on the JLQCD Collaboration's calculation of form factors for the exclusive semileptonic decay of B meson to pion on $2+1$-flavour lattices with lattice spacings from 0.080 fm down to 0.044 fm. Using the Möbius domain wall fermion action for both sea and valence quarks, we simulate pions with masses down to 230 MeV. By utilizing a range of heavy quark masses up to 2.44 times the mass of the charm quark we can extrapolate to the physical b quark mass. We discuss the dependence of the form factors on the pion mass, heavy quark mass, lattice spacing and the momentum-transfer. We extract the CKM matrix element $|V_{ub}|$ through a simultaneous fit with the $B \to \pi$ differential branching fractions provided by the Belle and BaBar collaborations after a chiral-continuum and physical b quark extrapolations of our lattice data.

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