Superfluid-insulator transition in a two-dimensional bond-disordered quantum rotor model MIN-CHUL CHA, SUNG-BEEN PARK, Dept. of Applied Physics, Hanyang University, Korea — We study the critical properties of the superfluid-insulator transition in a disordered two-dimensional quantum rotor model with random spatial bonds. Via worm-algorithm Monte Carlo calculations of superfluid density, compressibility, and correlation function, we find the dynamical critical exponent $z \approx 1.17$ and the correlation length critical exponent $1/\nu \approx 1.2$ at commensurate filling, and $z \approx 2.0$ and $1/\nu \approx 1.5$ at incommensurate filling. These exponents are not consistent with the Bose-glass-to-superfluid transition and suggest possibility of new disordered insulating phase.

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