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Rotational Mismatches and Emittance Growth in Intense Beams.[1] CHRISTOS PAPADOPOULOS, RAMI KISHEK, IRVING HABER, IREAP, University of Maryland — Particle Accelerators with intense beams have many applications for probing the structure of matter at a multitude of scales. Using a scaled low-energy electron beam, UMER (The University of Maryland Electron Ring) cleverly accesses the intense, high brightness, regime of beam operation in accelerators, at a much lower cost than larger and more energetic machines. This is a numerical study of the effects of a rotation of the UMER beam at injection. A closely related mismatch is the presence of a skew quadrupole in the transport channel. In both cases, the mismatch is a source of free energy and thus can lead to beam instabilities. The evolution and dissipation of such instabilities causes emittance growth that degrades the beam quality. In our simulations, we used the WARP computer code to simulate the UMER beam and we have indeed seen a substantial emittance growth for both cases of mismatch.

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