SINGULARITIES AND SELF-INTERSECTIONS OF HOLOMORPHIC DISCS (ABSTRACT)

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It is shown in this work that for any Lagrangian torus L in $\mathbb{R}^4$ and for a generic choice of compatible asymptotically standard almost complex structures there exists an immersed Maslov index 2 holomorphic disc with boundary on L. Moreover, for a generic choice of compatible asymptotically standard almost complex structures the set of somewhere injective holomorphic discs with boundary on L and Maslov index 2 contains at most finitely many holomorphic discs admitting a singularity. Such a non-immersed somewhere injective holomorphic disc has exactly one critical point, which necessarily lies on the boundary and is of first order. For the proof of this an intersection theory of higher order for holomorphic discs is developed and further consequences are drawn.