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## Atiyah-Patodi-Singer index theorem on a lattice

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Atiyah-Singer index theorem on a lattice without boundary is well understood owing to the seminal work by Hasenfratz.

But its extension to the system with boundary (the so-called Atiyah-Patodi-Singer index theorem), which surprisingly plays a crucial role in T-anomaly cancellation between bulk- and edge-modes in 3+1 dimensional topological matters, is known only in the continuum theory and no lattice realization has been made so far.

In this work, we try to non-perturbatively define an alternative index from the lattice domain-wall fermion in 3+1 dimensions. We will show that this new index in the continuum limit, converges to the Atiyah-Patodi-Singer index defined on a manifold with boundary, which coincides with the surface of the domain-wall.

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