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Exploring the non-linear motion of the parsec-scale jet of FSRQ 1633+382

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Physics of relativistic jet in Active Galactic Nuclei (AGNs) is one of the prominent questions in astrophysics that has not been resolved to date. Particularly, the launching mechanism of the jet which occurs near the supermassive black hole is still poorly understood. FSRQ 1633+382 (z = 1.814), a powerful AGN with a prominent radio jet, is one of the best laboratories to study the innermost jet in detail. In this study, we have investigated kinematics of parsec-scale jet of FSRQ 1633+382 using Very Long Baseline Array (VLBA) data from 1994 to 2017. We found that at some point the radial distances of the propagating jet components are temporarily stopped. This indicates that the inner jet of FSRQ 1633+382 changes their direction multiple times. We applied a helical trajectory model to the non-linear motion and extracted the physical properties of the motion. Since the trajectory of the jet component reflects the topology of the magnetic field, our results suggest the presence of twisted magnetic field lines which are arisen from a magnetized accretion disk or a rotating supermassive black hole.