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Propagation analysis of the helicity-drive Alfven wave in the HIST spherical torus plasmas T. HYOBU, T. HANAO, H. HIRONO, K. ITO, K. MATSUMOTO, T. NAKAYAMA, Y. KIKUCHI, N. FUKUMOTO, M. NAGATA, University of Hyogo — Coaxial Helicity Injection is an efficient current-drive method used in spherical torus experiments. It is a key issue to investigate the dynamo mechanism required to maintain the plasmas. The behavior of a low frequency Alfven wave being possibly related to the dynamo current drive has been studied on HIST. The observed magnetic fluctuation with about 80 kHz propagates along the open flux column (OFC) region, spreading toward the core region. The parallel phase velocity is estimated at 321 km/s from the propagation velocity measured axially along the OFC. The parallel phase velocity agrees well to the Alfven velocity. The radial perpendicular propagation of the Alfven wave can be calculated by a theory based on cold or warm plasma approximation with the Hall term. The theoretical calculation indicates that there are two resonance points and is a cut-off point. These resonance and cut-off points agree well with the magnetic measurement. A part of fluctuation propagates slowly beyond the first resonance point. The wave polarization is left-handed near the resonance point and then converts to be nearly liner outside the resonance point. From these results, we speculate that the torsional Alfven wave evolves to the kinetic Alfven wave during the radial propagation.

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