



**MT 26**  
**International Conference**  
**on Magnet Technology**  
*Vancouver, Canada | 2019*

Contribution ID: **1033**

Type: **Poster Presentation**

## **Tue-Af-Po2.24-03 [102]: Poloidal Vector Potential Transformer**

*Tuesday, 24 September 2019 14:00 (2 hours)*

We constructed a long and flexible solenoid coil by winding a thin, enameled wire around a slightly thicker enameled wire. The structure of this flexible solenoid resembles that of a string of a guitar or a piano. The flexible solenoid is wound on a torus in toroidal direction.

A usual toroidal coil winds the winding in the poloidal direction, but our coils are wound in the toroidal direction. Furthermore, the winding is not a simple copper wire but the flexible solenoid. The structure of this coil is the coiled-coiled of the coil and it is nested in multiple. The structure of such a coil is used as the primary coil of the poloidal vector potential transformer. This primary coil provided with the current return path does not generate a net magnetic field outside the coil.

The secondary coil of the poloidal vector potential transformer was realized by placing a toroidal coil in its internal cavity. Since there is practically no magnetic field outside the sufficiently long solenoid coil, there is no magnetic flux inside this secondary coil, but a finite induced voltage has been observed. The induced voltage is proportional to frequency at low frequencies, but sharply increased at high frequencies with higher order of frequency response such as the squared to cubed. In this coil, the vector potential generated by the primary coil while it orbits the poloidal surface can interact with the secondary coil many times. We report the transfer characteristics, the effect of the electromagnetic shield, the result compared with the toroidal vector potential coil.

**Primary authors:** Dr DAIBO, Masahiro (Iwate University); Ms DETMOD, Thitaporn (King Mongkut's Institute of Technology Ladkrabang)

**Presenter:** Dr DAIBO, Masahiro (Iwate University)

**Session Classification:** Tue-Af-Po2.24 - Novel and Other Applications II