



Contribution ID: 270

Type: Poster

Sat-Mo-Po.02-02: Three-degree-of-freedom control strategy for the magnetically controlled capsule endoscope under the rotating magnetic field of dual permanent magnets

Saturday 5 July 2025 09:30 (1h 45m)

For a single permanent magnet to control the orientation of the magnetically controlled capsule endoscope (MCCE), it is difficult to meet the demand for a complex orientation adjustment in three-dimensional space due to the non-uniformity of the magnetic field and insufficient torque. A cooperative control strategy of dual permanent magnets based on a rotating magnetic field is proposed to improve the orientation accuracy of the MCCE in the digestive tract. The control strategy provides a stable rotating magnetic field reference by one permanent magnet. Another rotating magnetic field dynamically adjusts the angle or direction, thus realizing the orientation adjustment of the MCCE in three degrees of freedom: roll, pitch, and yaw. This paper calculates the rotating magnetic field distribution of double external permanent magnets and the magnetic moment acting on the MCCE based on the magnetic dipole model under the control strategy. Finally, the proposed control strategy is verified through experiments. The results show that the control strategy significantly improves the accuracy of the MCCE's orientation adjustment and provides a feasible method for this in the digestive tract environment.

Author: Mr TENG, Zhifan (Institute of Electrical Engineering, Chinese Academy of Sciences)

Co-authors: Mr REN, Jixiong (Institute of Electrical Engineering, Chinese Academy of Sciences); Dr SUN, Hongbo (Institute of Electrical Engineering, Chinese Academy of Sciences); Dr LIU, Quanyue (Institute of Electrical Engineering, Chinese Academy of Sciences); Dr JI, Jiawen (Institute of Electrical Engineering, Chinese Academy of Sciences); Prof. LIU, Jianhua (Institute of Electrical Engineering, Chinese Academy of Sciences); Prof. WANG, Qiuliang (Institute of Electrical Engineering, Chinese Academy of Sciences)

Presenter: Mr TENG, Zhifan (Institute of Electrical Engineering, Chinese Academy of Sciences)

Session Classification: Sat-Mo-Po.02 - Magnets for Other Medical Application III