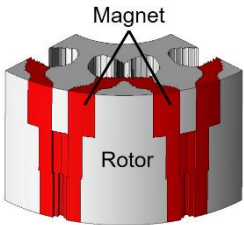
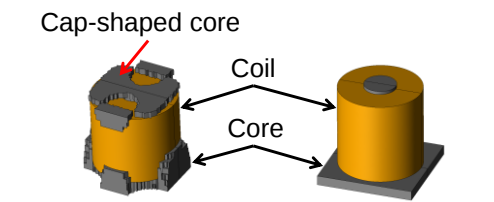


Name OTOMO Yoshitsugu	Job Title Assistant Professor	Area of Expertise Computational Electromagnetism, Design Optimization
1. Main Research Topics ① Topology optimization of rotating machines In the optimization of rotating machines, we need to consider various constraints while maximizing the motor performance. To address the above optimization problem, we have developed the topology optimization method, which freely determines the magnetic core and permanent magnet shapes without introducing shape parameters. Recently, we focus on developing the 3-D topology optimization method because this approach can directly improve the 3-D magnetic effect in the motor such as the end effect. The optimized rotor obtained using the 3-D topology optimization is exhibited in the figure.  Optimized 3-D rotor ② Topology optimization of wireless power transfer devices The improvement of the magnetic coupling between Tx and Rx coils is crucial to enhance the power transfer efficiency of wireless power transfer (WPT) devices. In this study, we have developed the topology optimization method for WPT devices considering both magnetic and circuit properties. The optimized WPT coils obtained using the topology and parameter optimizations are shown in the figure. The key feature of the optimized coil obtained using the topology optimization is the cap-shaped magnetic core. This shape leads to achieving the power transfer efficiency over 90 %.  Cap-shaped core Coil Core Topology optimization Efficiency: 94 % Parameter optimization Efficiency: 82 % ③ Development of novel approaches for computational electromagnetism The topology optimization of electric machines requires the long computation time to obtain the optimal shape. To address this problem, we have developed the novel approaches for computational electromagnetism (e.g. Homogenization method, Circuit analysis method, and Machine learning).		
2. Keywords Electrical machines, computational electromagnetism, shape optimization, topology optimization, rotating machines, wireless power transfer		
3. Remarks and Websites We have proposed the novel approaches to realize the superior electric machines using the topology optimization. In future works, we plan to develop the novel 3-D optimization strategies to apply the multi-physics problems. researchmap: https://researchmap.jp/yoshitsugu_otomo Laboratory: https://www.eee.nagasaki-u.ac.jp/labs/pec/abe-otomo-lab/index.html		