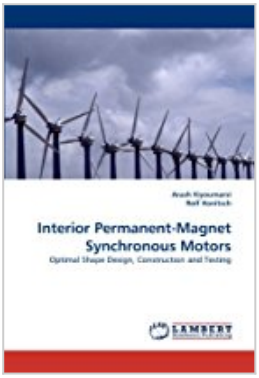




# Interior Permanent-Magnet Synchronous Motors: Optimal Shape Design, Construction and Testing

*By Arash Kiyoumarsi, Rolf Hanitsch*



**Interior Permanent-Magnet Synchronous Motors: Optimal Shape Design, Construction and Testing** By Arash Kiyoumarsi, Rolf Hanitsch

Brushless permanent magnet (PM) motors can be divided into the PM synchronous AC motor (PMSM) and PM brushless DC motor (PMBDCM). The former has sinusoidal airgap flux and the back EMF, thus has to be supplied with sinusoidal current to produce constant torque. The PMBDCM has the trapezoidal back EMF, so the rectangular current waveform in its armature winding is required to obtain the low torque ripple. Generally, the magnets with parallel magnetization are used in the PMSM while the magnets with radial magnetization are suitable for the BDCM. The interior PM (IPM) synchronous machine is being studied as a promising candidate for high-power starter/alternator in future internal combustion engine vehicles. The other many popular applications of IPM machine are traction, machine tool, spindle drives, air conditioning compressors and electrical vehicles. Torque ripple minimization in PM motors is conventionally obtained by either good motor design or appropriate control strategies. In design optimization programs, a reliable and detailed analysis of the torque and back-EMF of the machine should be performed.

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**Interior Permanent-Magnet Synchronous Motors: Optimal Shape Design, Construction and Testing By Arash Kiyoumarsi, Rolf Hanitsch Bibliography**

- Sales Rank: #3435191 in Books
- Published on: 2011-01-18
- Original language: English
- Number of items: 1
- Dimensions: 8.66" h x .22" w x 5.91" l, .33 pounds
- Binding: Paperback
- 96 pages

## Editorial Review

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