

An eddy current speed sensor for rectangular bars

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Eddy current speed sensors have attracted fewer attentions in comparison with other types of speed sensors such as optical and variable reluctance speed sensors despite their simplicity and non-destructive configuration. Recent developments in the electronic signal processing with higher precision and more compact structure cause that the eddy current speed sensors are attractive for numerous industrial applications. Utilizing motional eddy currents in the conductive metallic bodies with smooth surface is common in electromagnetic devices, for example, eddy current brakes. The same phenomena from motional eddy currents effects could be utilized in the eddy current speed sensors. Motional eddy current causes asymmetric magnetic flux distribution around permanent magnet or coil as excitation source, which can be detected by induction coils, Hall sensors, fluxgate sensors or AMR sensors [1]. We use excitation coils and pick up coils with AC signal in this paper. Excitation and pick up coils can have perpendicular or parallel configuration [2]-[4]. Axisymmetric coils with parallel configuration are considered in this paper, which wound around the moving conductive rectangular bars [3]. The aluminium and solid iron bars used for the moving part are measured and analyzed to evaluate magnetic materials effects on the performance of eddy current speed sensor. The 2D and 3D numerical models are developed for the analysis of the eddy current speed sensors with rectangular bars for moving part. The measurements and analysis are performed at different speeds and excitation frequencies.

References

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