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## Dynamic behaviors of electric steels better understood with static hysteresis model **FREE**

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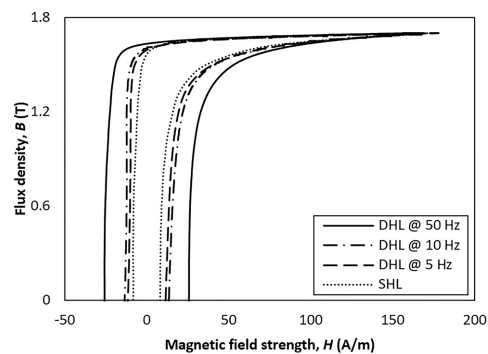


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A simplified approach to constructing a static hysteresis loop could improve understanding of magnetic materials.



Magnetic materials, such as electrical steels, are increasingly important in industry for their use in power transformers and rotating machines. Over the years, many analytical and experimental methods have been developed to understand the hysteresis behaviors of these materials, but they often are complex or require special equipment.

In a simpler approach, Hamzehbahmani created a model to construct a static hysteresis loop from dynamic measurements and energy loss analysis during the magnetization process. This method could provide an easier path for energy loss analysis of electrical steels.

Since many aspects of magnetic hysteresis depend on the rate of magnetization, Hamzehbahmani developed a method based on the analysis of a material's dynamic behavior over a range of magnetic flux densities.

Focusing on grain-oriented electrical steels, Hamzehbahmani used the phenomenological concepts of rate dependent and rate independent energy loss mechanism to construct a static hysteresis loop. The constructed hysteresis loop was implemented for dynamic modelling of the material based on the thin sheet model.

By allowing a more in-depth picture of dynamic behaviors of magnetic materials, the work could be useful in characterizing materials for new purposes. This work could help further the applications of magnetising processes and energy loss mechanism of the material, such as for use in power transformers.

"I am hoping to use this approach for other magnetic materials for further understanding energy loss mechanism and magnetising processes," said author Hamed Hamzehbahmani. "I hope this model attracts attention from other researchers working in the same field."

**Source:** "Static hysteresis modelling for grain-oriented electrical steels based on the phenomenological concepts of energy loss mechanism," by Hamed Hamzehbahmani, *Journal of Applied Physics* (2021). The article can be accessed at <https://doi.org/10.1063/5.0058554>.

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