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Modeling and simulation of surface roughness in ultrasonic assisted magnetic abrasive finishing process

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Highlights

- A novel approach to mathematically model the surface roughness during UAMAF based on process physics has been presented.
- The model incorporates and recognizes the existence of a critical roughness value; further finishing does not improve the roughness value.
- The instantaneous rate of reduction in surface roughness has been considered as a function of the instantaneous value of surface roughness.
- The various constants used during the modeling of the surface roughness were determined by inverse estimation from the experimental observations.
- The model establishes an exponential correlation between instantaneous roughness value and finishing time during finishing.
- The maximum difference in predicted and experimental values of surface roughness was found to be $\pm 7.35\%$.

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