Characterizing of superconducting tape quality by measuring magnetic AC susceptibility

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Exposure of a sample to a magnetic field changing in time generates loops of electrical currents that are detectable in a contactless way with the help of a suitable pick-up system.

The magnetic response of the tape is generated only by the currents induced in superconductor (SC). Complex magnetic susceptibility is given by:

\[ 
\chi' = \frac{\mu_0}{2B_{\text{max}}} \int_0^{2\pi} m_y(\omega t) \cos(\omega t) \, dt 
\]

\[ 
\chi'' = \frac{\mu_0}{2B_{\text{max}}} \int_0^{2\pi} m_y(\omega t) \sin(\omega t) \, dt 
\]

Critical currents of THEVA tapes measured magnetically before and after using stycast and compared to transport measurements.

Magnetic mapping of T6-06 tape.

Screening currents in SC tape.

Conclusion:

- The measurement and analysis of magnetic AC susceptibility was used to investigate quality of SC tapes before and after using stycast.
- Results of magnetic measurements were compared to transport measurements.