Short-range Ferromagnetism in Alloy Ribbons of Fe-Cr-Si-Nb-(Ag, Cu) - DTU Orbit
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We have studied the magnetic properties of two amorphous alloy ribbons $\text{Fe}_{72}\text{Cr}_{6}\text{Si}_{4}\text{Nb}_{5}\text{B}_{12}\text{Ag}_{1}$ (FCSNB-Ag) and $\text{Fe}_{72}\text{Cr}_{6}\text{Si}_{4}\text{Nb}_{5}\text{B}_{12}\text{Cu}_{1}$ (FCSNB-Cu), prepared by using a melt-spinning technique. Magnetization ($M$) measurements for various temperatures ($T$) and magnetic fields ($H$) indicate that ferromagnetic-paramagnetic (FM-PM) phase transitions take place in FCSNB-Ag and FCSNB-Cu at Curie temperatures ($T_C$) of about 308.3 K and 322.5 K, respectively. Analyses of $M$ - $H$ data at different temperatures in the vicinity of the FM-PM phase transition based on the modified Arrott plot method and scaling hypothesis yielded the exponent values of $\beta = 0.369 \pm 0.005$, $\gamma = 1.359 \pm 0.005$ and $\delta = 4.7 \pm 0.1$ for FCSNB-Ag, and $\beta = 0.376 \pm 0.002$, $\gamma = 1.315 \pm 0.006$ and $\delta = 4.5 \pm 0.1$ for FCSNB-Cu. Compared with the values from theoretical models, these values are close to those expected for the 3D Heisenberg model, demonstrating the existence of short-range FM order in the amorphous alloy ribbons.

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