Magnetic Instabilities along the Superconducting Phase Boundary of Nb/Ni Multilayers$^1$ WENTAO XU, AMISH JOSHI$^2$, SERGIY KRYUKOV, LANCE DE LONG, University of Kentucky, ELVIRA GONZALEZ, ELENA NAVARRO, JAVIER VILLEGAS, JOSE VICENT, Universidad Complutense Madrid — We report vibrating reed and SQUID magnetometer data that exhibit prominent cusps or oscillations of the SC onset temperature, $|\Delta T_C(H)| \approx 0.01$ to $0.7$ K, for a $[\text{Nb}(23\text{nm})/\text{Ni}(5\text{nm})]_5$ multilayer (ML) in DC magnetic fields applied nearly parallel to the ML plane. The vibrating reed data exhibit additional structures below $T_C$ that may mark multiple SC transitions or vortex lattice rearrangements within the ML. This striking behavior would then pose new challenges for theoretical and experimental investigations of SC/FM interfaces that involve “pi phase shifts” of the SC order parameter and exotic (“LOFF”) pairing states. Alternatively, the anomalies may signal dynamical instabilities within a confined, strongly anisotropic Abrikosov vortex lattice.

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