Thermodynamic critical field and Upper critical field of under-doped YBa$_2$Cu$_3$O$_{6+x}$ cuprates PATRICIA SALAS, M. A. SOLIS, M. FORTES, INSTITUTO DE FISICA, UNIVERSIDAD NACIONAL AUTONOMA DE MEXICO — In the frame of the Layered Boson-Fermion superconductivity model applied to cuprate superconductors, we obtain the condensation energy, the thermodynamic critical field and the upper critical field for underdoped cuprate superconductors YBa$_2$Cu$_3$O$_{6+x}$, with $x \in [0.55, 0.9]$ ranging from underdoped to optimally doped. The only two parameters of the system, which are the impenetrability of the planes and the paired fermion fraction below the critical temperature T_c, are uniquely determined by minimizing the Helmholtz free energy and fixing the experimental critical temperature. We compare our results for *a)* the thermodynamic critical field and the upper critical field as functions of temperature for several doping values, and *b)* the thermodynamic critical field and the upper critical field for $T = 0$ as functions of doping, with experimental data and show they are in very good agreement. [1] P. Salas, M. Fortes, M. A. Solis and F. J. Sevilla, Physica C **534**, 37 (2016). [2] P. Salas, M. A. Solis, M. Fortes and F. J. Sevilla, submited to Int. Jou. Mod. Phys. B.

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