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Generalized Lawson tau-surfaces and nonmaximality

Recently Penskoï generalized the well-known two-parametric family of Lawson tau-surfaces $\tau_{r,m}$ minimally immersed in spheres to a three-parametric family $T_{a,b,c}$ of tori and Klein bottles minimally immersed in spheres. It was remarked that this family includes surfaces carrying all extremal metrics for the first non-trivial eigenvalue of the Laplace-Beltrami operator on the torus and on the Klein bottle: the Clifford torus, the equilateral torus and the bipolar Lawson Klein bottle $\tilde{\tau}_{3,1}$.

In my talk, I will survey and describe recent progress on this three-parametric family (and subfamilies) of tori and Klein bottles. I will also discuss nonmaximality of metrics induced on $T_{a,b,c}$.