Complex martensitic microstructures in $\mathrm{Ti}_{76}\mathrm{Nb}_{22}\mathrm{Al}_2$

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Abstract. Remarkable martensitic microstructures are observed in the alloy $\mathrm{Ti}_{76}\mathrm{Nb}_{22}\mathrm{Al}_2$, which undergoes a cubic to orthorhombic transformation with six martensitic variants $\mathbf{U}_i = \mathbf{U}_i^T > 0$ having middle eigenvalue $\lambda_2(\mathbf{U}_i)$ very close to 1. Assuming that $\lambda_2(\mathbf{U}_i) = 1$ there are exactly 12 matrices in the set of energy wells $\bigcup_{i=1}^{6} SO(3)\mathbf{U}_i$ that are rank-one connected to $\mathbf{1}$. This set of 12 matrices has no rank-one connections. We attempt to understand the observed microstructures by studying gradient Young measures, exact gradients and T_N-configurations supported on these 12 matrices. This is joint work with Tomonari Inamura and Francesco Della Porta.

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