On one variant of Decomposition Lemma dealing with weakly converging sequences of gradients and applications to nonconvex variational problems

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We obtain the variant of Decomposition Lemma due to Kinderlehrer and Pedregal asserting that an arbitrary bounded sequence of gradients of Sobolev mappings $\{\nabla u_k\} \subseteq L^p(\Omega, \mathbf{R}^{m\times n})$, where $p > 1$, can be decomposed into a sum of two sequences of gradients of Sobolev mappings: $\{\nabla z_k\}$ and $\{\nabla w_k\}$, where $\{\nabla z_k\}$ is equintegrable and carries the same oscillations, while $\{\nabla w_k\}$ carries the same concentrations as $\{\nabla u_k\}$. In our setting we additionally impose the general trace condition "$u_k = u$" on F, where F is given closed subset of $\bar{\Omega}$ and we show that under this assumption the sequence $\{z_k\}$ in decomposition can be chosen to satisfy also the trace condition $z_k = u$ a.e. on F.
The result is applied to nonconvex variational problems to regularity results for sequences minimizing functionals. As the main tool we use DiPerna Majda measures.

References

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