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A nonlinear elliptic problem with terms concentrating in the boundary

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In this paper we investigate the behavior of a family of steady state solutions of a nonlinear reaction diffusion equation when some reaction and potential terms are concentrated in a \$\epsilon\$-neighborhood of a portion \Gamma\$ of the boundary. We assume that this \$\epsilon\$-neighborhood shrinks to \$\Gamma\$ as the small parameter \$\epsilon\$ goes to zero. Also, we suppose the upper boundary of this \$\epsilon\$-strip presents a highly oscillatory behavior. Our main goal here is to show that this family of solutions converges to the solutions of a limit problem, a nonlinear elliptic equation that captures the oscillatory behavior. Indeed, the reaction term and concentrating potential are transformed into a flux condition and a potential on \$\Gamma\$, which depends on the oscillating neighborhood.

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