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Blow-up analysis for nodal radial solutions in Moser-Trudinger critical equations in $\mathbb{R}^2$

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Abstract. In this paper we consider sign-changing radial solutions u_ε to the problem

$$\begin{cases} -\Delta u = \lambda u e^{u^2+|u|^{1+\varepsilon}} & \text{in } B \\ u = 0 & \text{on } \partial B, \end{cases}$$

and we study their asymptotic behaviour as $\varepsilon \searrow 0$.

We show that when $u_\varepsilon = u_\varepsilon(r)$ has k interior zeros, it exhibits a multiple blow-up behaviour in the first k nodal sets while it converges to the least energy solution of the problem with $\varepsilon = 0$ in the $(k+1)$-th one. We also prove that in each concentration set, with an appropriate scaling, u_ε converges to the solution of the classical Liouville problem in $\mathbb{R}^2$.

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