

# Asymptotic Analysis of Radial Point Rupture Solutions for Elliptic Equations

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Assume a region  $\Omega \subset \mathbb{R}^2$ , and consider the general elliptic equation

$$\Delta u = f(u)$$

Where  $f$  is a positive continuous function satisfying

$$\lim_{u \rightarrow 0^+} f(u) = \infty.$$

Motivated by the thin film equations, a solution  $u$  is said to be a point rupture solution if for some  $p \in \Omega$ ,  $u(p) = 0$  and  $u(p) > 0$  in  $\Omega \setminus \{p\}$ . We are interested in the asymptotic behavior of radial solutions. Our main goal is to understand the dependence of the limiting profile of radial solutions  $u$  and their associated energies versus their prescribed volume.