

# Focusing Solutions of Porous Medium Equations with Reaction

Yuan Wei Qi

Hong Kong University of Science and Technology

Hong Kong

Email: [maqi@ust.hk](mailto:maqi@ust.hk)

## Abstract

In this talk we construct self-similar focusing solutions for the porous medium equation with reaction  $u_t = \Delta u^m + \lambda r^{-(2-\sigma)} u^{m-\sigma} |\nabla u|^\sigma$ , where  $m > 1$ ,  $0 < \sigma < 2$ . The solution has the initial distribution in the exterior of a ball, *i.e.* there is a hole in the support of initial value, and in finite time  $T$  the hole disappears. This is an example of a self-similar solution of the second kind, that is the similarity variables cannot be determined *a priori* from dimensional consideration. Furthermore, they supply concrete bounds for the regularity of general solutions of the equation. The p-Laplacian counterpart of this equation is also studied.