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The geometry of free boundaries in PDE

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ABSTRACT:

Free boundary problems naturally arise in phenomena such as ice melting and iron behavior under abrupt temperature changes during forging (quenching). These problems can be formulated as seeking a pair (Ω, u), where Ω represents the domain and u is a function satisfying a specific partial differential equation (PDE) in Ω.

Understanding the domain's geometry is a crucial yet challenging aspect, with open questions dating back to the 1980s. This lecture will cover some classical results in the linear and nonlinear scenarios. Key differences between this scenarios will be discussed, highlighting the challenges of the nonlinear case and compare the methods in each case. This comparison unveils some geometric results in the nonlinear case.

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