BOUNDARY VARIATIONS AND ANALYTIC CONTINUATION IN ELECTROMAGNETIC AND ACOUSTIC SCATTERING*

Fernando Reitich
School of Mathematics
University of Minnesota
Minneapolis, MN 55455

Joint work with **Oscar Bruno** (Applied Mathematics, Caltech).

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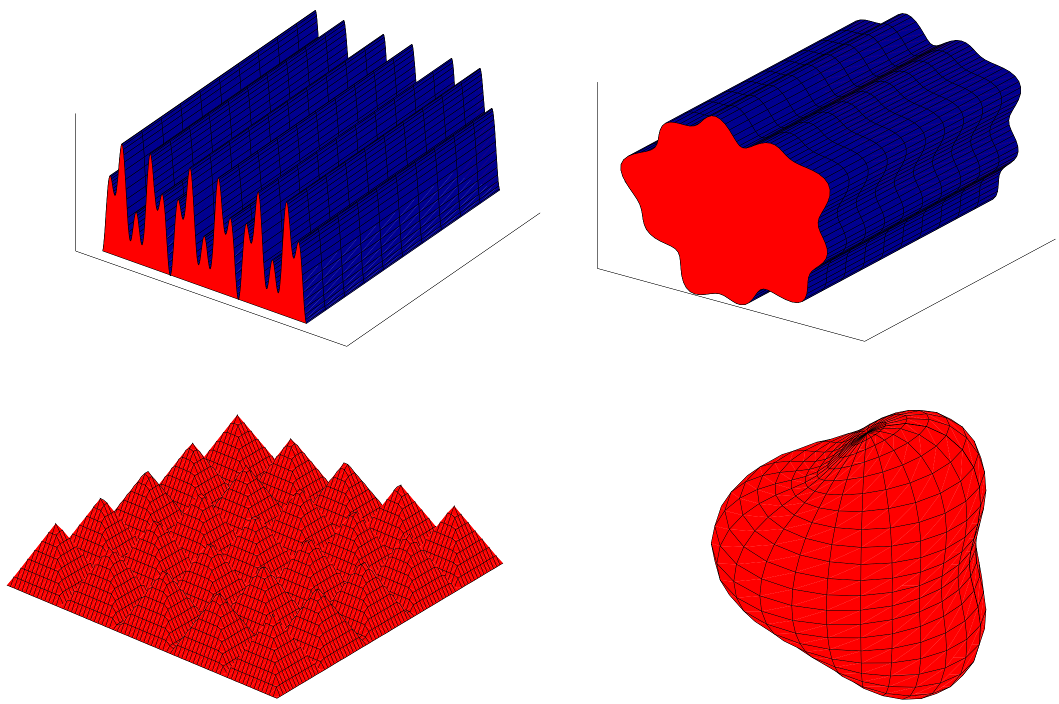
ELECTROMAGNETIC AND ACOUSTIC SCATTERING



Resonance regime: wavelength ≈ lengthscale of scatterer

(time-harmonic)

MAXWELL'S EQUATIONS	HELMHOLTZ EQUATION

$$\nabla \times \vec{E} = i\omega\mu\vec{H}$$
$$\nabla \times \vec{H} = -i\omega\epsilon\vec{H}$$

$$\Delta V + k^2 V = 0$$

with appropriate boundary conditions

$$\vec{n} \times \left(\vec{E}^{\text{out}} - \vec{E}^{\text{in}}\right) = 0 \qquad\qquad V^{\text{out}} = 0$$

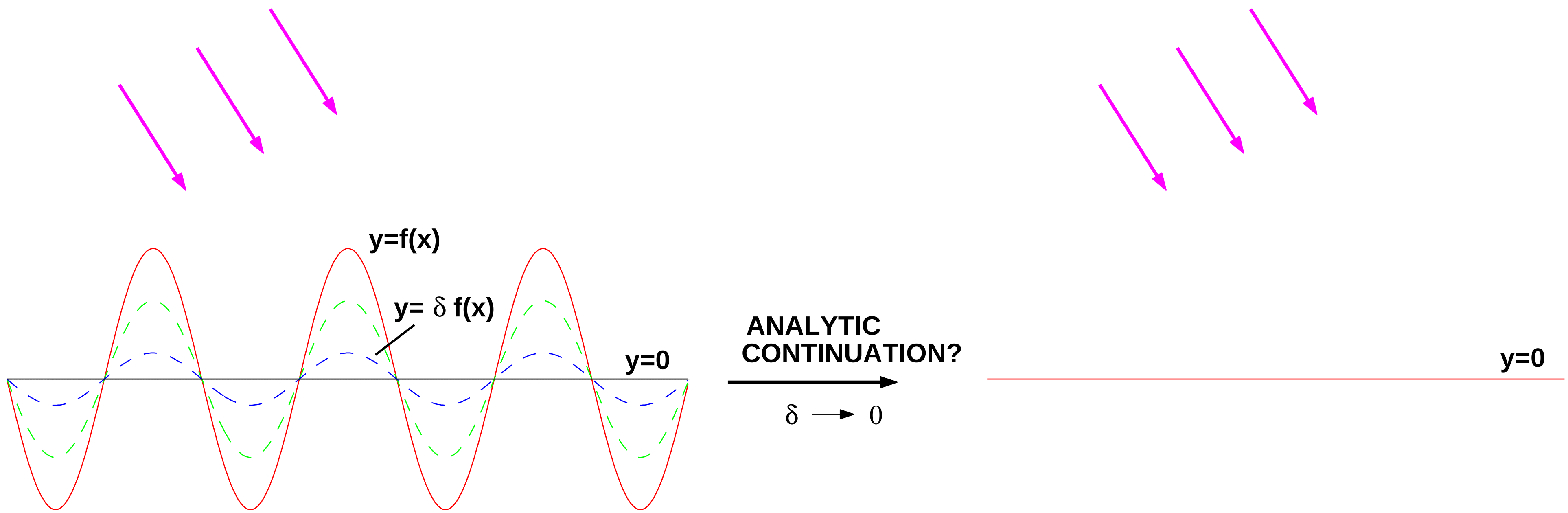
and $\vec{n} \times \left(\vec{H}^{\text{out}} - \vec{H}^{\text{in}}\right) = 0$ or $\dfrac{\partial}{\partial n} V^{\text{out}} = 0$

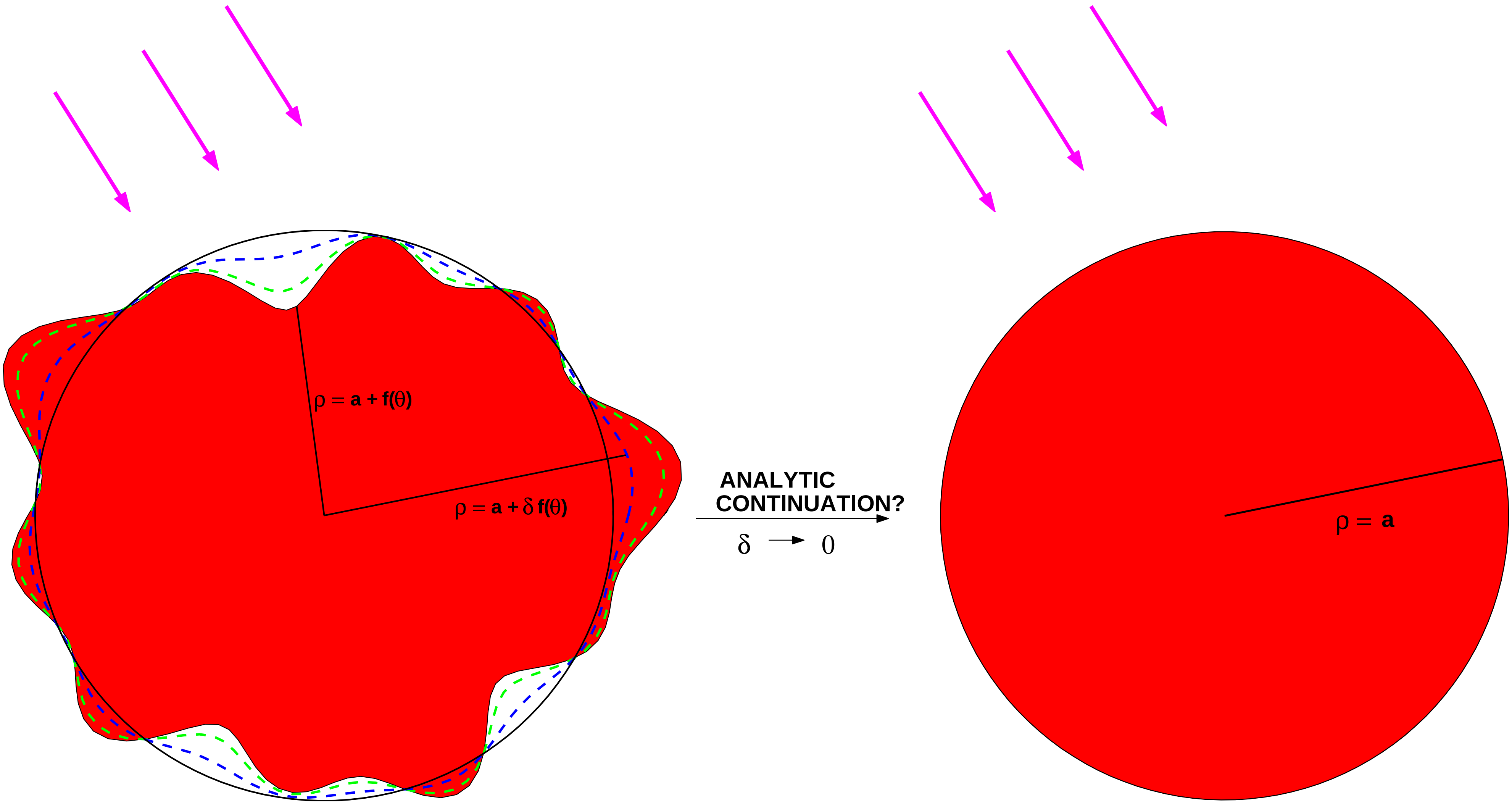
Here $\vec{E}^{\text{out}} = \vec{E}^0 + \vec{E}^+$, $\vec{H}^{\text{out}} = \vec{H}^0 + \vec{H}^+$; $V^{\text{out}} = V^0 + V^+$

Solution by

- Integral Equations
- Finite Elements
- Finite Differences
- ...
- Variation of Boundaries: O. Bruno/FR,
  - Perfectly conducting 2D gratings, *Proc. Royal Soc. Edin.*, 1992
  - Dielectric and metallic 2D and 3D gratings, *J. Opt. Soc. Amer.*, 1993
  - 2D bounded obstacles, *ACES J.*, 1996
  - 3D bounded obstacles, *J. Acoust. Soc. Amer.*, 1998
  - Cavities and waveguides (eigenvalue problems), 1999

Idea: High-order perturbations ...


y=f(x)
y= δ f(x)
y=0
ANALYTIC
CONTINUATION?
δ → 0
y=0



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