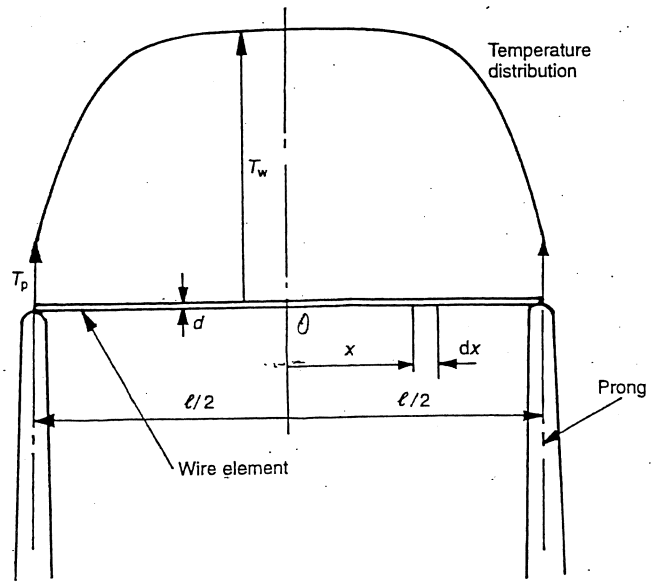
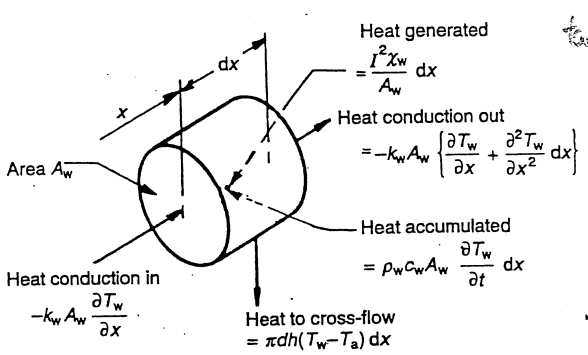
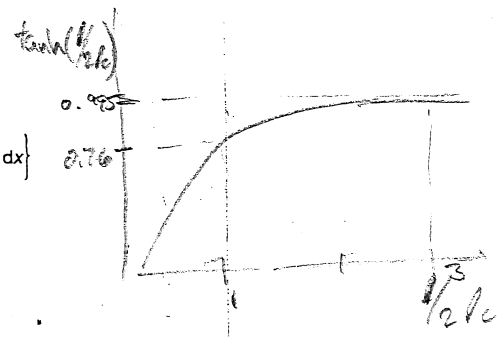


No Directionality to Hot wire. Single wire.

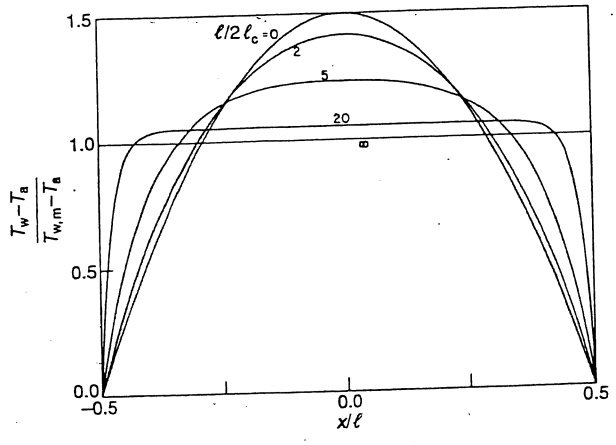




$T_a = T_\infty$ = ambient T

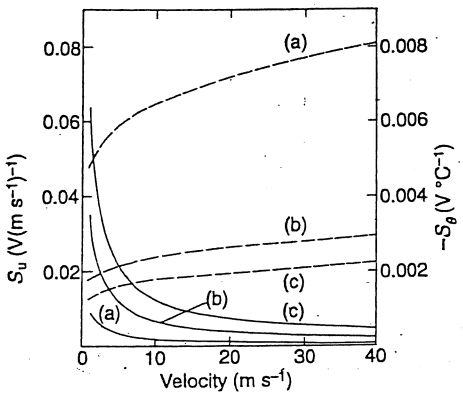
$\ell/2\ell_c > 2$

Fig. 2.1. The hot-wire geometry and heat balance for an incremental element.



$$l_c = \frac{d_w}{2}\left[\frac{R_w}{k_f}\frac{R_w}{R_a}\frac{1}{Nu}\right]^{1/2}$$

$$q_{cond} = \frac{2 k_w A_c (T_{w\infty} - T_a)}{l_c} \tanh\left(\frac{l}{2l_c}\right)$$



Subscript θ refers to temperature

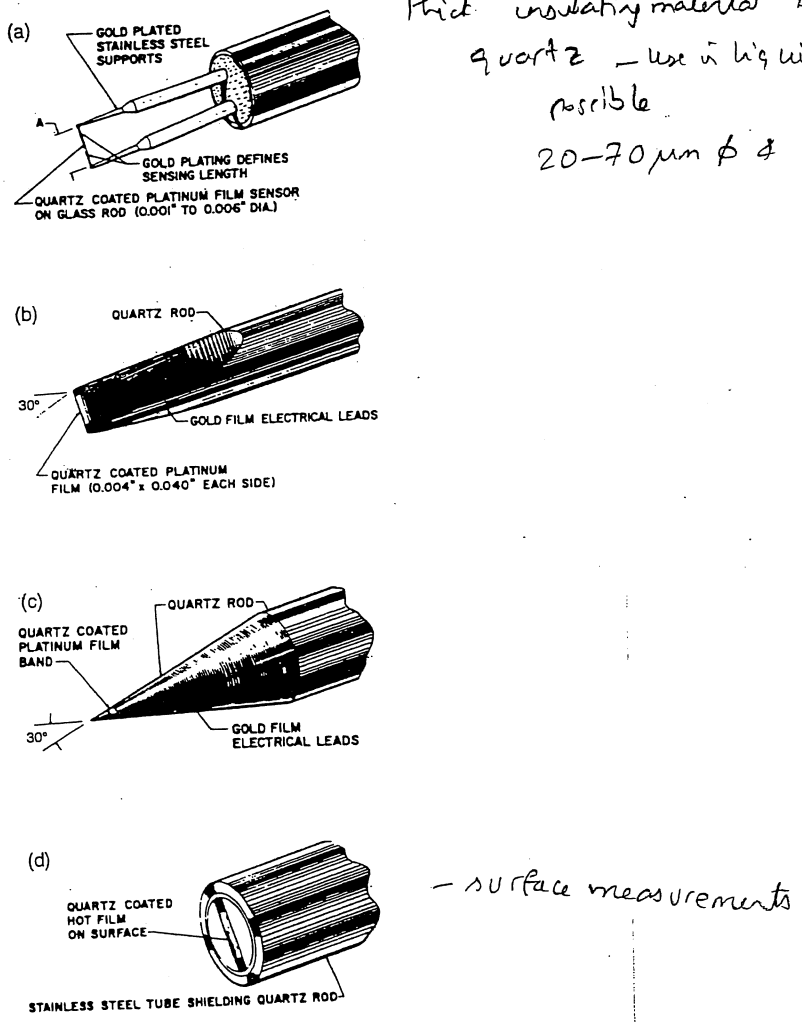
g. 2.2. The temperature distribution along a hot-wire for various values of $\ell/2\ell_c$. (From eymuth 1979.)

Fig. 2.3. The variation in (—) the velocity and (- - -) the temperature sensitivity with velocity and for temperature differences $T_w - T_a$ of: (a) 10 °C, (b) 100 °C and (c) 250 °C.

"Hot Wire Anemometry : Priciples & Signal Analysis" H.H.Bruun, Oxford Univ. Press

Companies that make hot wires
TSI
Dantec

Thin (0.1 μm) Pt or Ni films deposited on insulating substrate (quartz). This film is usually coated with 1–2 μm thick insulating material such as quartz — use in liquids made possible
20–70 μm ϕ & 1–2 mm long



— surface measurements

Fig. 2.4. Hot-film probe types: (a) cylindrical, (b) wedge, (c) cone, and (d) flush mounted. (Reprinted with the permission of TSI Inc.)

TABLE 2.1 *Physical properties of common hot-wire materials*

Material	Ultimate tensile strength ($N\,cm^{-2}$)	Temperature coefficient of resistivity, α_{20} ($°C^{-1}$)	Resistivity, χ_{20} ($\mu\Omega$ cm)	Thermal conductivity, k_w ($W\,cm^{-1}\,°C^{-1}$)	Density, ρ_w ($kg\,m^{-3}$)	Specific heat, c_w ($kJ\,kg^{-1}\,°C^{-1}$)	Available as Wollaston wire?	Melting point (°C)	Comments
Tungsten	250 000	0.0036	5.5	1.9	19 300	0.14	No	3410	Oxidizes above 350 °C, cannot be soldered
Platinum	35 000	0.0038	9.8	0.7	21 500	0.13	Yes	1770	Soft and weak
Platinum–rhodium (90–10%)	70 000	0.0016	19	0.4	19 900	0.15	Yes	1830	Stronger than Pt
Platinum–iridium (80–20%)	140 000	0.0008	32	0.17	21 600	0.13	Yes	1840	Stronger than Pt

Wollaston wires: Pt covered with Ag & drawn thru a die. Wire is then soldered or welded to prongs & Pt is exposed by etching the Ag sheath.

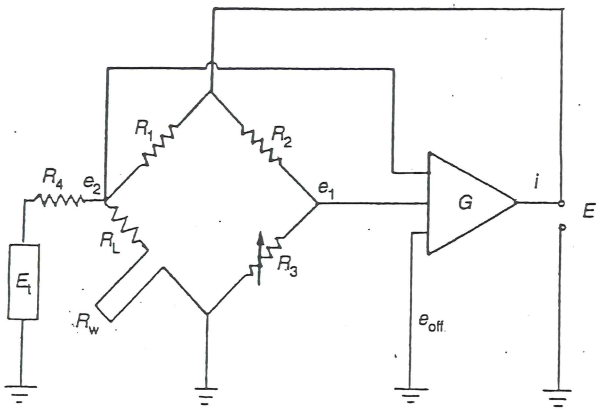


Fig. 2.12. A *CT* anemometer containing a Wheatstone bridge, a feedback amplifier, and an electronic-testing subcircuit.

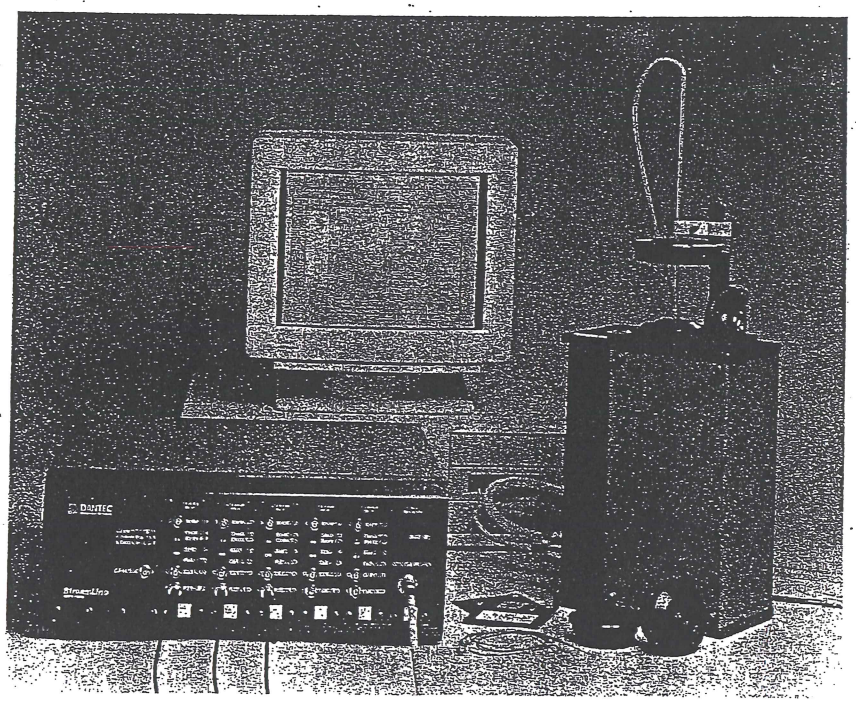


Fig. 2.13. A computer-controlled *CT* anemometer and a nozzle calibration facility. (Reprinted with the permission of DANTEC Measurement Technology.)