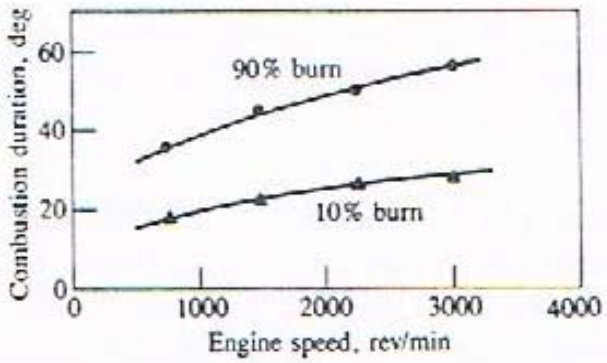

FIGURE 9-17
Effect of engine speed on flame-development angle (0 to 10 percent burned) and overall burning angle (0 to 90 percent burned). $\phi = 1.0$, intake pressure 0.54 atm, spark 30° BTC.[20]

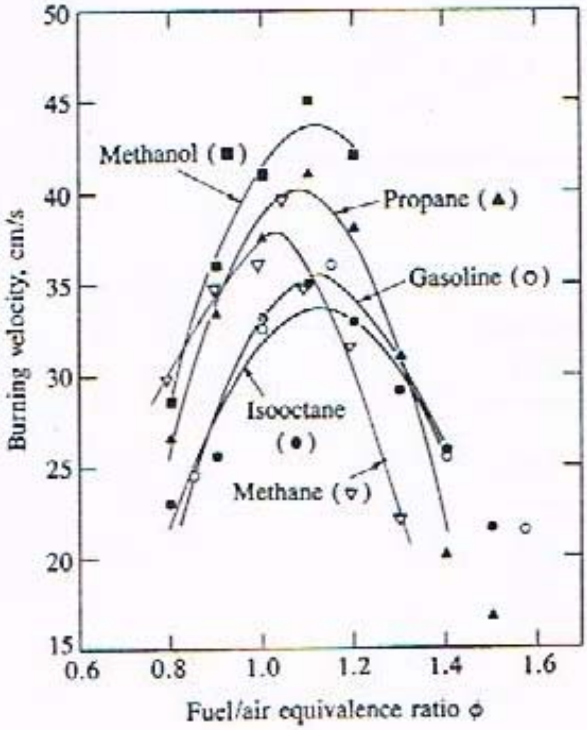

FIGURE 9-25
Laminar burning velocity for several fuels as function of equivalence ratio, at 1 atm and 300 K. Lines are least-squares polynomial fits to data.[29, 30]

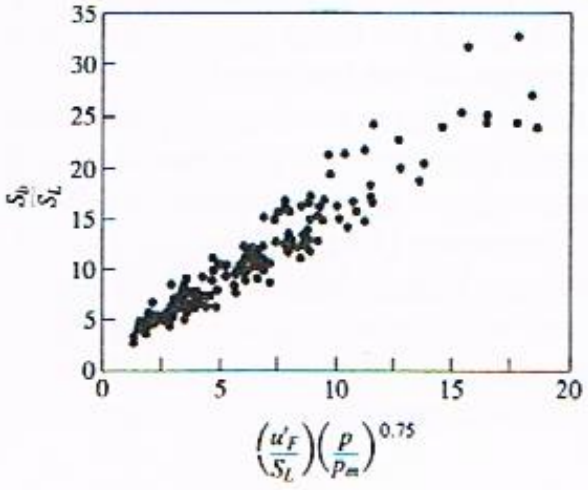

FIGURE 9-30
Variation of burning speed with turbulence intensity. The ensemble-averaged rms velocity fluctuation was measured during motoring engine operation. The ratio p/p_m (firing pressure/motoring pressure) corrects for the effect of additional compression on the turbulence intensity. Range of engine speeds and spark timings.[35]

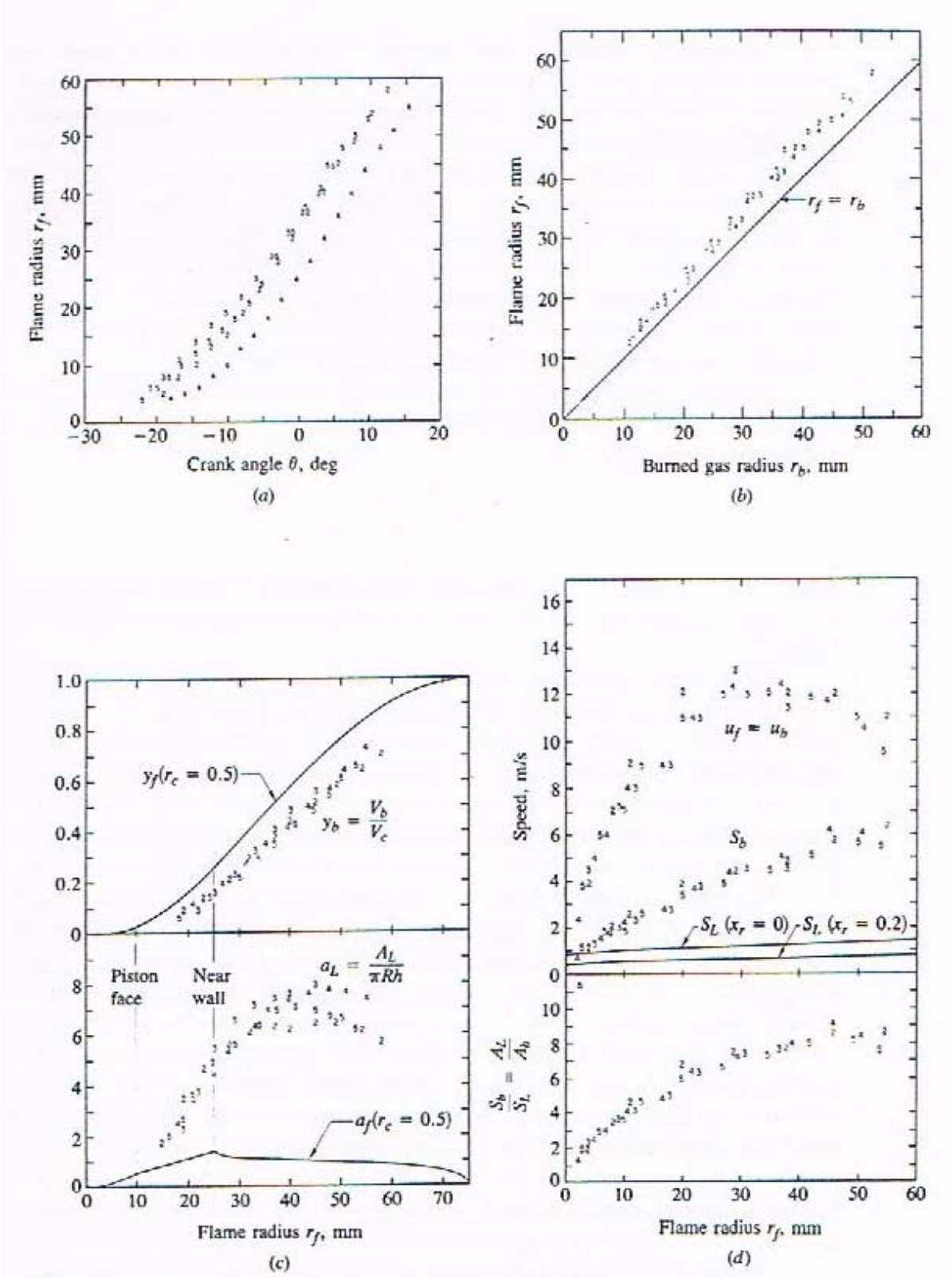

FIGURE 9-28
Variation of flame geometry and velocity parameters during four individual combustion cycles at 1044 rev/min, $\phi = 0.98$, 1 atm inlet pressure: (*a*) flame radius r_f versus crank angle; (*b*) flame radius r_f versus burned gas radius r_b; (*c*) normalized enflamed volume y_f, burned volume y_b, normalized flame front area a_f, and laminar area a_L versus flame radius; (*d*) front expansion speed u_b, burning speed S_b, and laminar flame speed S_L versus flame radius. (*From Beretta* et al.[4])

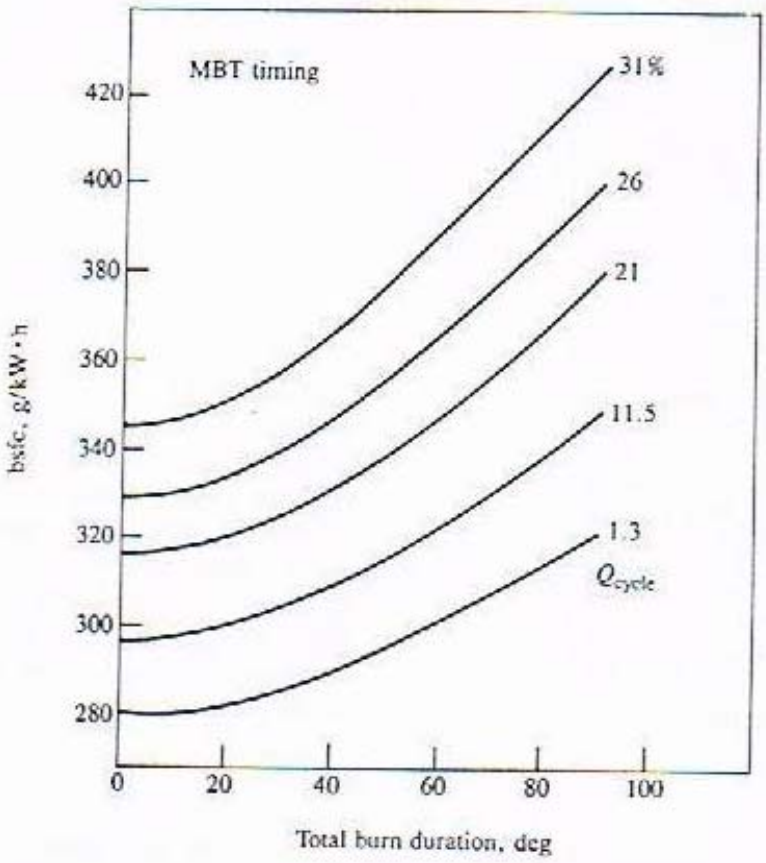

FIGURE 14-11
Predicted brake specific fuel consumption as a function of heat transfer per cycle to the combustion chamber walls (as a percent of the fuel's heating value) and total burn duration [$\Delta\theta$ in Eq. (14.32)]. 1250 rev/min, 262 kPa bmep, fuel/air equivalence ratio = 0.91, maximum brake torque spark timing.[15]

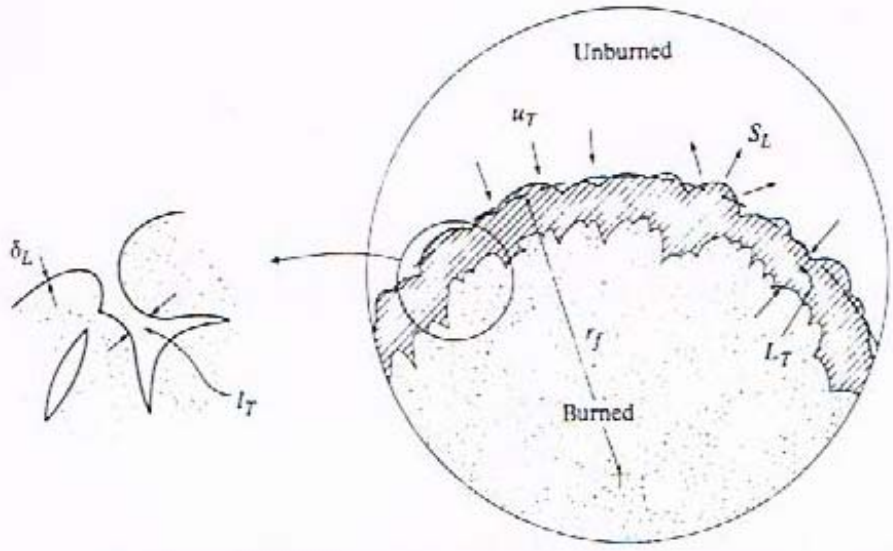

FIGURE 14-12
Schematic of turbulent premixed spark-ignition engine flame, illustrating the physical basis fc burning law of Eqs. (14.33) to (14.35). The approximately spherical front of the "thick" turbulet flame (dashed line) diffuses outward at the laminar flame speed S_L. Fresh mixture also crosses th front at a characteristic velocity u_T due to turbulent convection. Schematic on left shows detaile flame structure: δ_L is a reaction-sheet thickness, l_T is characteristic scale of wrinkles in the sheet.

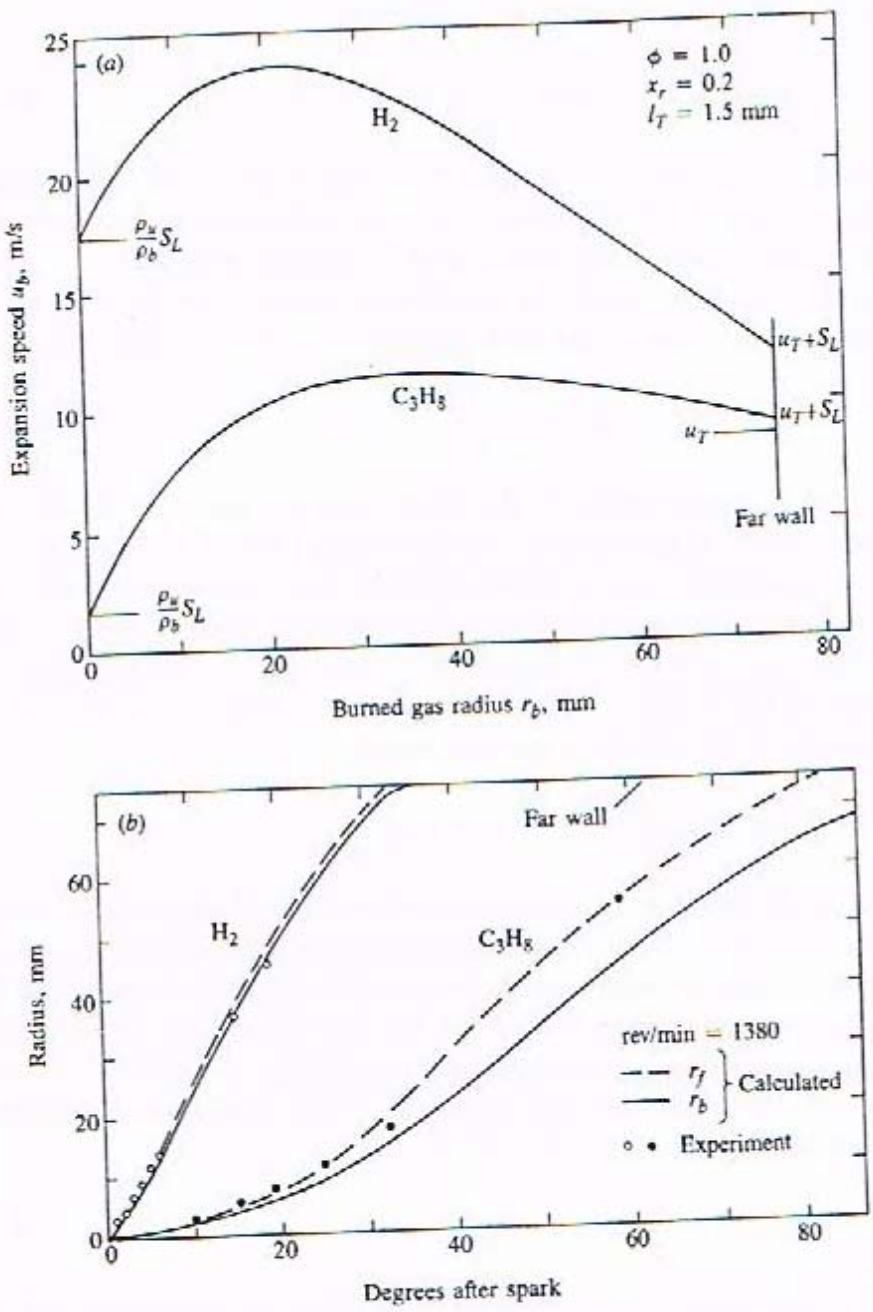

FIGURE 14-13
(*a*) Calculated burned gas expansion speed u_b for stoichiometric hydrogen-air and propane-air mixtures as a function of burned gas radius r_b. (*b*) Comparison of experimentally measured (points) and calculated (dashed curve) flame radii r_f for these mixtures as a function of crank angle. Also shown (solid curve) is the burned gas radius r_b.[18]

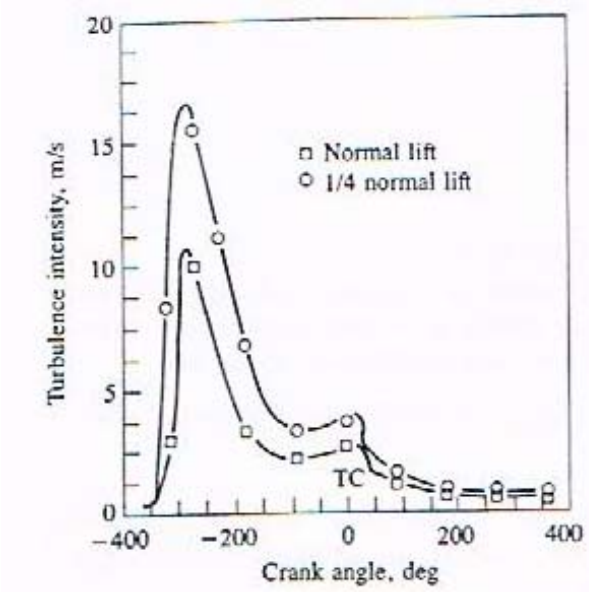

FIGURE 14-14
Predicted turbulence intensity u' as a function of crank angle and valve lift in engine operating at 1500 rev/min, 414 kPa imep, with a compression ratio of 10.[27]

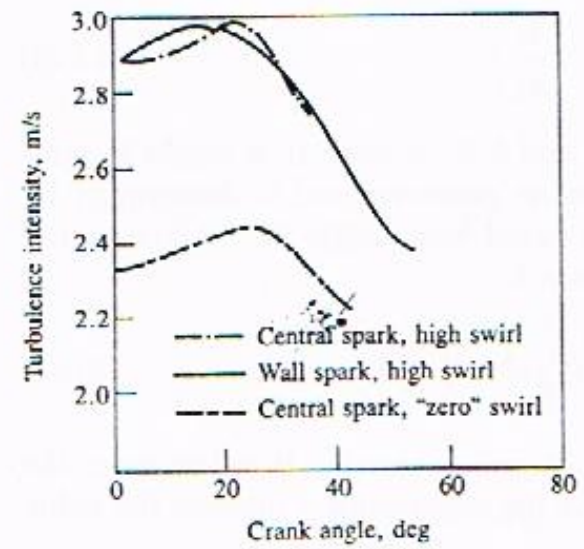

FIGURE 14-15
Predicted turbulence intensity during combustion for high and "zero" swirl levels for central and cylinder wall spark plug locations. Same engine and operating conditions as in Fig. 14-14.[28]

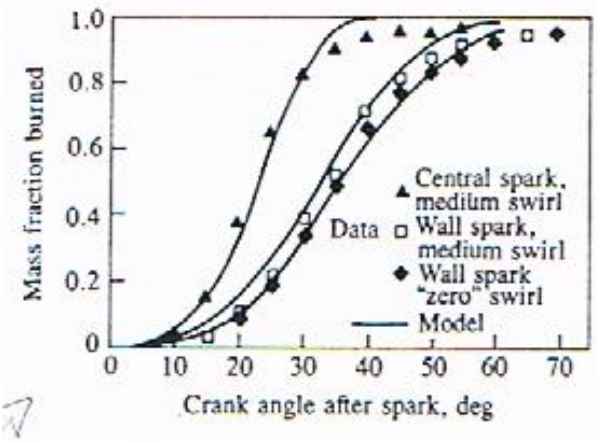

FIGURE 14-16
Comparisons of predicted and measured mass fraction burned versus crank angle profiles for same swirl levels and plug locations as Fig. 14-15.[28]