

Contents

Preface	v
1 Introduction	1
2 Schrödinger Equation, its Separation and its Exact Eigenfunctions	15
2.1 Separation of the time-independent Schrödinger equation for the internal motion	18
2.2 Properties of the eigenfunctions of the time-independent Schrödinger equation for the internal motion	22
3 Development in Time of the Probability Amplitude for a Decaying State	27
4 Phase-Integral Method	30
4.1 Phase-integral approximation generated from an unspecified base function	31
4.2 Connection formulas associated with a single transition point	38
4.2.1 Connection formulas pertaining to a first-order transition zero on the real axis	38
4.2.2 Connection formula pertaining to a first-order transition pole at the origin	40

4.3	Connection formula for a real, smooth, single-hump potential barrier	42
4.3.1	Wave function given as a standing wave	44
4.3.2	Supplementary quantity $\tilde{\phi}$	46
4.4	Quantization conditions for single-well potentials	49
5	Derivation of Phase-Integral Formulas for Profiles, Energies and Half-Widths of Stark Levels	52
5.1	Positions of the Stark levels	64
5.2	Formulas for the calculation of dL/dE , dK_{2n}/dE and dK/dE	66
5.3	Half-widths of the Stark levels	67
6	Procedure for Transformation of the Phase-Integral Formulas into Formulas Involving Complete Elliptic Integrals	69
	Adjoined Papers by Anders Hökback and Per Olof Fröman	75
7	Phase-Integral Quantities and Their Partial Derivatives with Respect to E and Z_1 Expressed in Terms of Complete Elliptic Integrals	77
7.1	The ξ -equation	78
7.2	The η -equation in the sub-barrier case	82
7.3	The η -equation in the super-barrier case	83
8	Numerical Results	89
	References	145
	Name Index	149
	Subject Index	151