

ÍNDICE

Capítulo 1: Introducción	1
Antecedentes y objetivos de la investigación	3
Estructura de la Tesis	6
Capítulo 2: Publicaciones	11
<i>Using a mobile phone acceleration sensor in physics experiments on free and damped harmonic oscillations</i>	13
Abstract	15
1. Introduction	15
2. Experimental setup.....	16
3. Free harmonic oscillations	18
4. Damped harmonic oscillations	22
5. Conclusions	24
6. Acknowledgments.....	24
7. References	25
<i>Direct visualization of mechanical beats by means of an oscillating smartphone</i>	27
1. Introduction	29
2. Equations governing the beats	30
3. Description of the experiment and analysis	33
4. Acknowledgments.....	35
5. References	35
<i>Theoretical and experimental study of the normal modes in a coupled two-dimensional system</i>	37
Abstract	39
1. Introduction	40
2. Experimental setup.....	42
3. Hessian matrix formalism	43
4. Results and discussions	48
5. Conclusions	53
6. Acknowledgments.....	53
7. References	53

<i>Determining the efficiency of optical sources using a smartphone's ambient light sensor</i>	57
Abstract	59
1. Introduction	59
2. Methods	61
3. Results and discussions	63
3.1. Incandescent and halogen lamps	63
3.2. LEDs	68
4. Conclusions	69
5. Acknowledgments	71
6. References	71
<i>Visualizing acoustical beats with a smartphone</i>	75
Abstract	77
1. Introduction	77
2. Basic theory	80
3. Experimental results	83
4. Conclusions	87
5. Acknowledgments	87
6. References	88
Capítulo 3: Discusión de los resultados	91
Aportaciones realizadas	93
Evaluación de los resultados	95
Capítulo 4: Conclusiones	99
Cumplimiento de los objetivos	101
Perspectivas futuras	102
Bibliografía general	105