


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Vibration spectrum of a two-soliton molecule in dipolar Bose-Einstein condensates (Article)

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Abstract

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Abstract We study the vibration of soliton molecules in dipolar Bose-Einstein condensates by variational approach and numerical simulations of the nonlocal Gross-Pitaevskii equation. We employ the periodic variation of the strength of dipolar atomic interactions to excite oscillations of solitons near their equilibrium positions. When the parametric perturbation is sufficiently strong the molecule breaks up into individual solitons, like the dissociation of ordinary molecules. The waveform of the molecule and resonance frequency, predicted by the developed model, are confirmed by numerical simulations of the governing equation. © 2015 Elsevier B.V.

Author keywords

Bound state Dipolar interaction Soliton Vibration spectrum

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- 1 Abdullaev, F.Kh., Gammal, A., Kamchatnov, A.M., Tomio, L.
 Dynamics of bright matter wave solitons in a Bose-Einstein condensate
 (2005) *International Journal of Modern Physics B*, 19 (22), pp. 3415-3473. Cited 102 times.
 doi: 10.1142/S0217979205032279

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- 2 Kevrekidis, P.G., Frantzeskakis, D.J., Carretero-González, R.
 (2008) *Emergent Nonlinear Phenomena in Bose-Einstein Condensates: Theory and Experiment*. Cited 351 times.
 Springer-Verlag Berlin, Heidelberg

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Baizakov, B.B. , Al-Marzoug, S.M. , Bahlouli, H.
 (2015) *Physical Review A - Atomic, Molecular, and Optical*

Physics

- 3 Stratmann, M., Pagel, T., Mitschke, F.
Experimental observation of temporal soliton molecules
 (2005) *Physical Review Letters*, 95 (14), art. no. 143902. Cited 173 times.
http://oai.aps.org/oai/?verb=ListRecords&metadataPrefix=oai_apsmeta_2&set=journal:PRL:95
 doi: 10.1103/PhysRevLett.95.143902
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-
- 4 Rohrmann, P., Hause, A., Mitschke, F.
Solitons beyond binary: Possibility of fibre-optic transmission of two bits per clock period
 (2012) *Scientific Reports*, 2, art. no. 866. Cited 33 times.
 doi: 10.1038/srep00866
 View at Publisher
-
- 5 Hause, A., Mitschke, F.
Higher-order equilibria of temporal soliton molecules in dispersion-managed fibers
 (2013) *Physical Review A - Atomic, Molecular, and Optical Physics*, 88 (6), art. no. 063843. Cited 12 times.
<http://oai.aps.org/filefetch?identifier=10.1103/PhysRevA.88.063843&component=fulltext&description=markup&format=xml>
 doi: 10.1103/PhysRevA.88.063843
 View at Publisher
-
- 6 Hause, A., Hartwig, H., Böhm, M., Mitschke, F.
Binding mechanism of temporal soliton molecules
 (2008) *Phys. Rev. A*, 78, p. 063817. Cited 55 times.
-
- 7 Alamoudi, S.M., Al Khawaja, U., Baizakov, B.B.
Averaged dynamics of soliton molecules in dispersion-managed optical fibers
 (2014) *Physical Review A - Atomic, Molecular, and Optical Physics*, 89 (5), art. no. 053817. Cited 9 times.
<http://harvest.aps.org/bagit/articles/10.1103/PhysRevA.89.053817/apsxml>
 doi: 10.1103/PhysRevA.89.053817
 View at Publisher
-
- 8 Grelu, P., Akhmediev, N.
Dissipative solitons for mode-locked lasers
 (2012) *Nature Photonics*, 6 (2), pp. 84-92. Cited 512 times.
 doi: 10.1038/nphoton2011345
 View at Publisher
-
- 9 Assanto, G.
 (2012) *Nematicons: Spatial Optical Solitons in Nematic Liquid Crystals*. Cited 50 times.
 John Wiley NJ
-
- 10 Rasmussen, P.D., Bang, O., Królikowski, W.
Theory of nonlocal soliton interaction in nematic liquid crystals
 (2005) *Physical Review E - Statistical, Nonlinear, and Soft Matter Physics*, 72 (6), art. no. 066611. Cited 108 times.
http://oai.aps.org/oai/?verb=ListRecords&metadataPrefix=oai_apsmeta_2&set=journal:PRE:71
 doi: 10.1103/PhysRevE.72.066611
 View at Publisher

Antisymmetric soliton in a dispersion-managed fiber laser
 Chong, A. , Buckley, J.R. , Wise, F.W.
 (2006) *Optics InfoBase Conference Papers*

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-
- 11 Chen, W., Shen, M., Kong, Q., Shi, J., Wang, Q., Krolikowski, W.
Interactions of nonlocal dark solitons under competing cubic-quintic nonlinearities
- (2014) *Optics Letters*, 39 (7), pp. 1764-1767. Cited 18 times.
http://www.opticsinfobase.org/view_article.cfm?gotourl=http%3A%2F%2Fwww%2Eopticsinfobase%2Eorg%2FdirectPDFAccess%2F6EEF451D-9FA9-5D28-AED95ECED51E90A5_281946%2Fol-39-7-1764%2Epdf%3Fda%3D1%26id%3D281946%26seq%3D0%26mobile%3Dno&org=Elsevier%20Inc
doi: 10.1364/OL.39.001764
- View at Publisher
-
- 12 Griesmaier, A., Werner, J., Hensler, S., Stuhler, J., Pfau, T.
Bose-Einstein condensation of chromium
- (2005) *Physical Review Letters*, 94 (16), art. no. 160401. Cited 697 times.
<http://scitation.aip.org/getpdf/servlet/GetPDFServlet?filetype=pdf&id=PRLTAO000094000016160401000001&idtype=cvips>
doi: 10.1103/PhysRevLett.94.160401
- View at Publisher
-
- 13 Pedri, P., Santos, L.
Two-dimensional bright solitons in dipolar Bose-Einstein condensates
- (2005) *Physical Review Letters*, 95 (20), art. no. 200404. Cited 195 times.
http://oai.aps.org/oai/?verb=ListRecords&metadataPrefix=oai_apsmeta_2&set=journal:PRL:95
doi: 10.1103/PhysRevLett.95.200404
- View at Publisher
-
- 14 Tikhonenkov, I., Malomed, B.A., Vardi, A.
Anisotropic solitons in dipolar Bose-Einstein condensates
- (2008) *Physical Review Letters*, 100 (9), art. no. 090406. Cited 116 times.
http://oai.aps.org/oai?verb=GetRecord&Identifier=oai:aps.org:PhysRevLett.100.090406&metadataPrefix=oai_apsmeta_2
doi: 10.1103/PhysRevLett.100.090406
- View at Publisher
-
- 15 Cuevas, J., Malomed, B.A., Kevrekidis, P.G., Frantzeskakis, D.J.
Solitons in quasi-one-dimensional Bose-Einstein condensates with competing dipolar and local interactions
- (2009) *Physical Review A - Atomic, Molecular, and Optical Physics*, 79 (5), art. no. 053608. Cited 58 times.
http://oai.aps.org/oai?verb=GetRecord&Identifier=oai:aps.org:PhysRevA.79.053608&metadataPrefix=oai_apsmeta_2
doi: 10.1103/PhysRevA.79.053608
- View at Publisher
-
- 16 Abdullaev, F.K., Brazhnyi, V.A.
Solitons in dipolar Bose-Einstein condensates with a trap and barrier potential
- (2012) *Journal of Physics B: Atomic, Molecular and Optical Physics*, 45 (8), art. no. 085301. Cited 8 times.
http://iopscience.iop.org/0953-4075/45/8/085301/pdf/0953-4075_45_8_085301.pdf
doi: 10.1088/0953-4075/45/8/085301
- View at Publisher
-

-
- 17 Benseghir, A., Wan Abdullah, W.A.T., Umarov, B.A., Baizakov, B.B.
Parametric excitation of solitons in dipolar bose-einstein condensates

(2013) *Modern Physics Letters B*, 27 (25), art. no. 1350184.
doi: 10.1142/S0217984913501844

View at Publisher
-
- 18 Anderson, D.
Variational approach to nonlinear pulse propagation in optical fibers

(1983) *Physical Review A*, 27 (6), pp. 3135-3145. Cited 787 times.
doi: 10.1103/PhysRevA.27.3135

View at Publisher
-
- 19 Malomed, B.A.
Chapter 2 Variational methods in nonlinear fiber optics and related fields

(2002) *Progress in Optics*, 43 (C), pp. 71-193. Cited 244 times.
doi: 10.1016/S0079-6638(02)80026-9

View at Publisher
-
- 20 Gruebele, M., Wolynes, P.G.
Vibrational Energy Flow and Chemical Reactions

(2004) *Accounts of Chemical Research*, 37 (4), pp. 261-267. Cited 120 times.
doi: 10.1021/ar030230t

View at Publisher
-
- 21 Abdullaev, F.K., Gammal, A., Malomed, B.A., Tomio, L.
Bright solitons in Bose-Einstein condensates with field-induced dipole moments

(2014) *Journal of Physics B: Atomic, Molecular and Optical Physics*, 47 (7), art. no. 075301.
http://iopscience.iop.org/0953-4075/47/7/075301/pdf/0953-4075_47_7_075301.pdf
doi: 10.1088/0953-4075/47/7/075301

View at Publisher
-
- 22 Nath, R., Santos, L.
Faraday patterns in two-dimensional dipolar Bose-Einstein condensates

(2010) *Physical Review A - Atomic, Molecular, and Optical Physics*, 81 (3), art. no. 033626. Cited 31 times.
http://oai.aps.org/oai?verb=GetRecord&Identifier=oai:aps.org:PhysRevA.81.033626&metadataPrefix=oai_apsmeta_2
doi: 10.1103/PhysRevA.81.033626

View at Publisher
-
- 23 Abdullaev, F.K., Gammal, A., Malomed, B.A., Tomio, L.
Bright solitons in quasi-one-dimensional dipolar condensates with spatially modulated interactions

(2013) *Physical Review A - Atomic, Molecular, and Optical Physics*, 87 (6), art. no. 063621. Cited 9 times.
<http://oai.aps.org/filefetch?identifier=10.1103/PhysRevA.87.063621&component=fulltext&description=markup&format=xml>
doi: 10.1103/PhysRevA.87.063621

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-

-
- 24 Köhler, T., Góral, K., Julienne, P.S.
Production of cold molecules via magnetically tunable Feshbach resonances

(2006) *Reviews of Modern Physics*, 78 (4), pp. 1311-1361. Cited 629 times.
[http://oai.aps.org/oai?](http://oai.aps.org/oai?verb=GetRecord&Identifier=oai:aps.org:RevModPhys.78.1311&metadataPrefix=oai_apsmeta_2)
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doi: 10.1103/RevModPhys.78.1311

View at Publisher
-
- 25 Chin, C., Grimm, R., Julienne, P., Tiesinga, E.
Feshbach resonances in ultracold gases

(2010) *Reviews of Modern Physics*, 82 (2), pp. 1225-1286. Cited 1296 times.
[http://oai.aps.org/oai?](http://oai.aps.org/oai?verb=GetRecord&Identifier=oai:aps.org:RevModPhys.82.1225&metadataPrefix=oai_apsmeta_2)
[verb=GetRecord&Identifier=oai:aps.org:RevModPhys.82.1225&metadataPrefix=oai_apsmeta_2](http://oai.aps.org/oai?verb=GetRecord&Identifier=oai:aps.org:RevModPhys.82.1225&metadataPrefix=oai_apsmeta_2)
doi: 10.1103/RevModPhys.82.1225

View at Publisher
-
- 26 Lu, M., Burdick, N.Q., Youn, S.H., Lev, B.L.
Strongly dipolar Bose-Einstein condensate of dysprosium

(2011) *Physical Review Letters*, 107 (19), art. no. 190401. Cited 367 times.
[http://oai.aps.org/filefetch?](http://oai.aps.org/filefetch?identifier=10.1103/PhysRevLett.107.190401&component=fulltext&description=markup&format=xml)
[identifier=10.1103/PhysRevLett.107.190401&component=fulltext&description=markup&format=xml](http://oai.aps.org/filefetch?identifier=10.1103/PhysRevLett.107.190401&component=fulltext&description=markup&format=xml)
doi: 10.1103/PhysRevLett.107.190401

View at Publisher
-
- 27 Aikawa, K., Frisch, A., Mark, M., Baier, S., Rietzler, A., Grimm, R., Ferlaino, F.
Bose-Einstein condensation of erbium

(2012) *Physical Review Letters*, 108 (21), art. no. 210401. Cited 319 times.
[http://oai.aps.org/filefetch?](http://oai.aps.org/filefetch?identifier=10.1103/PhysRevLett.108.210401&component=fulltext&description=markup&format=xml)
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doi: 10.1103/PhysRevLett.108.210401

View at Publisher
-
- 28 Sinha, S., Santos, L.
Cold dipolar gases in quasi-one-dimensional geometries

(2007) *Physical Review Letters*, 99 (14), art. no. 140406. Cited 66 times.
[http://oai.aps.org/oai?](http://oai.aps.org/oai?verb=GetRecord&Identifier=oai:aps.org:PhysRevLett.99.140406&metadataPrefix=oai_apsmeta_2)
[verb=GetRecord&Identifier=oai:aps.org:PhysRevLett.99.140406&metadataPrefix=oai_apsmeta_2](http://oai.aps.org/oai?verb=GetRecord&Identifier=oai:aps.org:PhysRevLett.99.140406&metadataPrefix=oai_apsmeta_2)
doi: 10.1103/PhysRevLett.99.140406

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-
- 29 Paré, C., Bélanger, P.-A.
Antisymmetric soliton in a dispersion-managed system

(1999) *Optics Communications*, 168 (1), pp. 103-109. Cited 57 times.
doi: 10.1016/S0030-4018(99)00337-5

View at Publisher
-
- 30 Feng, B.-F., Malomed, B.A.
Antisymmetric solitons and their interactions in strongly dispersion-managed fiber-optic systems

(2004) *Optics Communications*, 229 (1-6), pp. 173-185. Cited 25 times.
doi: 10.1016/j.optcom.2003.10.025

View at Publisher
-

-
- 31 Uzer, T., Miller, W.H.
Theories of intramolecular vibrational energy transfer
(1991) *Physics Reports*, 199 (2), pp. 73-146. Cited 251 times.
doi: 10.1016/0370-1573(91)90140-H
[View at Publisher](#)
-
- 32 Press, W.H., Teukolsky, S.A., Vetterling, W.T., Flennary, B.P.
(1996) *Numerical Recipes. The Art of Scientific Computing*. Cited 22511 times.
Cambridge University Press Cambridge
-
- 33 Agrawal, G.P.
(1995) *Nonlinear Fiber Optics*. Cited 13803 times.
Academic Press New York
-
- 34 Landau, L.D., Lifshitz, E.M.
(1988) *Mechanics*. Cited 111 times.
Nauka Moscow
-
- 35 Atkins, P., Friedman, R.
(2005) *Molecular Quantum Mechanics*. Cited 1302 times.
Oxford University Press New York
-
- 36 García-Ripoll, J.J., Pérez-García, V.M., Torres, P.
Extended parametric resonances in nonlinear Schrödinger systems
(1999) *Physical Review Letters*, 83 (9), pp. 1715-1718. Cited 123 times.
[View at Publisher](#)
-
- 37 Rajendran, S., Muruganandam, P., Lakshmanan, M.
Nonstationary excitations in Bose-Einstein condensates under the action of
periodically varying scattering length with time dependent frequencies
(2007) *Physica D: Nonlinear Phenomena*, 227 (1), pp. 1-7. Cited 7 times.
doi: 10.1016/j.physd.2007.01.001
[View at Publisher](#)
-
- 38 Kevrekidis, P.G., Drossinos, Y.
Nonlinearity from linearity: The Ermakov-Pinney equation revisited
(2007) *Mathematics and Computers in Simulation*, 74 (2-3), pp. 196-202. Cited 14 times.
doi: 10.1016/j.matcom.2006.10.005
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