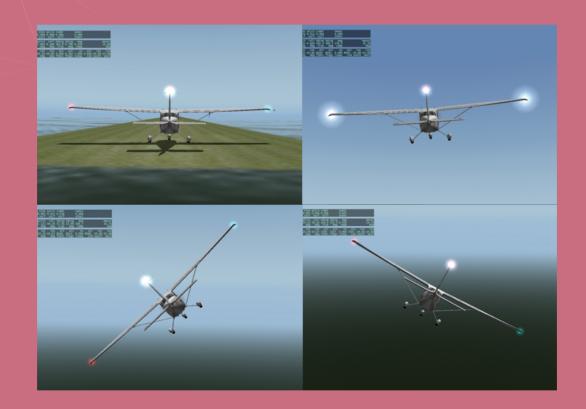
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### (ii) Book/Monograph

Hitchins, Derek K. System engineering: A 21<sup>st</sup> century systems methodology. John Wiley, London, 2007. 502p.

DeMers, M.N. Fundamentals of geographic information systems. Ed. 3. John Wiley, New York, 2005.

### (iii) Chapter from a Book

Bodony, D.J. & Lele, S.K. Applications and results for large-eddy simulations for acoustics: Far-field jet acoustics. *In* LES for eddy acoustics, edited by C. Wagner, T. Huttl & P. Sagaut. Cambridge University Press, Cambridge, UK, 2005. pp. 289-310. doi: 10.1017/CBO9780511546143.008

Lokesha, B.N. Advanced avionics and electronic warfare system for fighter aircraft. *In* DRDO Technology Spectrum. Defence Research and Development Organisation, New Delhi, 2008. pp. 10-26.

### (iv) Conference Paper

Puszynski, J.A. Recent advances and initiatives in the field of nanotechnology. Paper presented at 31st International Pyrotechnic Seminar, Fort Collins, Colorado, USA, July 2004. pp. 233-40.

Ekstein, J.; Freitag, E.; Hirsch, C. & Sattelmayer, T. Experimental study on the role of entropy diffusion waves in low-frequency oscillations for a diffusion burner. *In* Proceedings of the ASME Turbo Expo 2004: Power for Land, Sea, and Air. edited by R.S. Harris. ASME, Fairfield, NJ, 2004. doi:10.1115/GT2004-54163

### (v) Report

Savage, S.J. Defence applications of nanocomposite materials. FOI-Swedesh Defence Research Agency, User Report No. FOI-R-1524-SE. December 2004.

### (vi) Patent

Man, T.Y.; Leung, C.Y.; Leung, K.N.; Mok, P.K.T. & Chan, M. Single-transister-control low-dropout regulator. US Patent No. 7285952, 23 October 2007.

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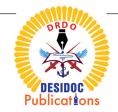
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