



SRINIVAS UNIVERSITY

Mangalore-575001, Karnataka (India)

Research center for Control Systems and Surface Coatings



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Areas of interest: Surface coatings, Control Systems

Many practical systems are multivariable in nature. Dynamic characteristics of the system are determined by the poles and zeros of the transfer function. The controller design is carried out based on the location of the poles of the system. In state space representation of the system, if all the states are available for measurements, then all the system poles can be shifted as specified by the designer. If limited number of outputs is available for measurements effort has to be made to locate all the poles with the help of output feedback. A numerically stable algorithm for pole assignment in controllable observable multivariable systems with output feedback has been carried. The work is also carried out using P, PI, PD and PID controller.

A coating of some metals improves the surface properties of the base metals. Based on the literature survey we have opted for the coating of Ni – Cr. The coating will be developed by electro – chemical deposition process. The selected combination of metals will impart improvements in hardness, wear and corrosion resistance of the base material. It is also having ferromagnetic nature which can be utilized in some of the special applications. The proposed work involves a detailed study on effect of different process parameters like bath compositions, bath temperature, pH, time for plating and the current densities used for different coatings and substrate materials. After completion of the deposition they are investigated for the base metal composition by using X – Ray Diffraction technique and Scanning Electron Microscopy imaging studies. Once the experiment is optimised, the coatings are characterized with microhardness and wear tests to investigate the effect of process parameters on them. A detailed investigation on coated samples for the magnetic properties with different coating thickness and process parameters is planned.

List of publications:

1. C Sneha, C Prabhukumar, M Jayalakshmi, Suma Bhat, K Udaya Bhat, Effect of substrate temperature on the characteristics of ZnO films produced by a combination of thermal vapour deposition and oxidation processes, J of Materials Science Materials in Electronics, 2017, 1-8, DOI: 10.1007/S10854-017-7493-2 (IF=1.9)

2. Udaya Bhat K, Arun Augustin, Suma Bhat and K R Udupa 'Preparation and Characterization of Copper thin films for antimicrobial applications' in Microscopy applied to Materials Science and Life Sciences, Ed Ajay Kumar Rane, Sabu Thomas, Nandakumar Kalarikkal, Krishnan Kanny, Apple Academic Publishing. CRC Press (Stage : Published)
3. Udaya Bhat K. Nithin, Suma Bhat, Sudeendran: Heat treatment of friction surfaced steel-aluminum couple, Materials Science Forum, 830-831, 2015, pp135-138.
4. KK Appukuttan, D Shikha, B Suma: An algorithm for constraint pole assignment using output feedback for multivariable systems, International Journal of Frontiers in Technology 1 (1), 2014, pp1-3.
5. Prashanth H., Suma Bhat and Udaya Bhat K, Hot dip aluminizing of Low carbon steel using Al-7Si-2Cu Alloy baths, Journal of Coatings, 2013, Article id:180740. <http://dx.doi.org/10.1155/2013/180740> (5 pages)
6. S Bhat, KK Appukuttan, An Alternate Method for Computation of Transfer Function Matrix, Journal of Control science and engineering 2010, pp 1-3.
H Suma, KK Appukuttan, An algorithm for design of a pid controller for a multivariable system using output feedback, International Journal of Engineering Science and Technology 2 (12), 2010, pp 7198 – 7202.
7. Suma Bhat and Udaya Bhat K, Cellular Materials, IIM Metal News, 12(2), April 2009, pp 8-12
8. A chapter on Joining of 'Dissimilar Materials Using Friction Welding' in a book titled 'Advances in Welding Technologies for Process Development' edited by Dr Jayakumar Vora and Dr. Vishvesh J Badheka. Publishers: CRC Press, Taylor's & Francis group (stage: Accepted)

Conference publications

1. Tarun Kumar Jugare, Jayalakshmi, Arun Augustin, **Suma Bhat**, Udaya Bhat K. Copper coatings on steel by friction surfacing, Intl Conf on 'Friction based materials, ICFP-2014', held at IISc., Bangalore, Sept 3-5. 2014. p 17.
2. Appukuttan K.K. **Suma H**, Multivariable Pole assignment procedure to control military air crafts, International conference on 'Frontiers in Mechanical Engineering, FIME 2010', held at NITK, Surathkal, during May 2010.
3. Appukuttan K.K. **Suma H** and Radhika Inapaglla, Computation of transfer function using Leverrier and Danvinsky methods, National Conference on 'Advances in Mechanical Science', Kumaraguru College of Technology, Coimbatore, held during Feb 2008.
4. Appukuttan K.K. **Suma H** and Radhika Inapaglla, Computation of transfer function from stage space model, National conference on 'Recent Advancements in Mechanical Engineering', Mahendra Engineering College, Thirechengode, held during July 2008.

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