

Study on the Impact of Talent Cultivation in Higher Education on Regional Innovation Level

-- Empirical Study based on Municipal Panel Data

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Abstract: In the era of accelerating the cultivation of new-type productive forces, exploring the relationship between talent cultivation in higher education and regional innovation helps optimize the positioning and resource allocation of higher education, and enables the high-quality development of new-type productive forces. This study empirically explores the impact of talent cultivation in higher education on regional innovation based on panel data from 283 cities in China from 2011 to 2021. The study found that talent cultivation in higher education is an important driving force for regional innovation in new-type productive forces, and its positive impact effect remains robust after using instrumental variables to alleviate endogeneity issues. Based on the above research results, this study proposes the following policy recommendations to promote the development of regional innovation: Firstly, strengthen the integration of industry-university-research cooperation between universities and regional innovation. Universities should actively approach regional innovation practices, closely align with the development needs of regional industries, optimize talent cultivation programs, and aim to cultivate innovative talents required by new-type productive forces. Secondly, strengthen the talent cultivation model in universities in the digital and intelligent era, and promote the construction of the "1236" education system. Thirdly, deepen talent cultivation through scientific research in universities. Scientific research is a basic function of universities, and the most cutting-edge technological innovations are the foundation of universities. In the era of digital intelligence, digital intelligence science and technology brought by university scientific research is the key to cultivating new-type productive forces. the era of cultivating new-type productive forces, exploring the relationship between talent cultivation in higher education and regional innovation helps optimize the positioning and resource allocation of higher education and empower the high-quality development of new-type productive forces. This study empirically explores the impact of talent cultivation in higher education on regional innovation based on panel data from 283 cities in China from 2011 to 2021. The study found that talent cultivation in higher education is an important driving force for regional innovation in new-type productive forces, and its positive impact effect remains robust after using instrumental variables to alleviate endogeneity issues. Based on the above research results, this article proposes the following policy recommendations to promote the development of regional innovation: Highlight the key supporting role of universities in new-type productive forces-driven regional innovation; Construct a new-type productive forces talent cultivation system characterized by digitization; Implement differentiated industry-university-research collaborative innovation strategies; Optimize the allocation of higher education resources in key areas of regional innovation development.

Keywords: New Quality Productivity; Talent Cultivation; Regional Innovation.

1. Introduction

The report of the 20th CPC National Congress proposed that education, technology, and talent are the fundamental and strategic supports for building a socialist modern country in an all-round way. [1]The knowledge and educational attributes of universities stipulate that talent cultivation is one of the basic functions of universities. Universities should actively respond to social needs and challenges, and provide high-quality digital intelligence talents with excellent quality and outstanding intelligence that match the new productive forces. [2] Talent is the most active factor in productivity. From agricultural civilization to the digital intelligence civilization represented by AI, the structure of productive forces is constantly evolving. Digital intelligence civilization provides richer labor materials for new productive forces than in the past, and the revolution of labor materials promotes the release of the creativity of digital intelligence talents. Digital intelligence talents have become the most active factor in the new productive forces. Currently, China's regional innovation

and development face many challenges: first, there is a large gap in innovation resources and capabilities among regions, and the level of innovation and development varies among eastern, central, and western regions; third, the fit between higher education talent cultivation and regional innovation needs to be further optimized. Therefore, exploring the influence mechanism and heterogeneous characteristics of higher education talent cultivation on regional innovation has important practical significance for promoting the high-quality development of regional innovation.

Economic growth theory emphasizes the long-term significance of innovation, technological progress, and human capital accumulation for economic growth, [3] and higher education is the proper meaning of promoting regional innovation as the main place for cultivating high-level talents. Currently, China's macroeconomy faces many challenges such as industrial structure imbalance, gradual disappearance of the demographic dividend, decline in total factor productivity, and increasing pressure on the ecological environment. In this context, there is an urgent need to replace the traditional labor-intensive development model by

developing a regional innovation-driven economy driven by higher education talents. [2] This is not only an important strategic choice to seize the opportunities brought by the new round of technological revolution and industrial transformation, but also an inevitable requirement to promote China's economic transformation and achieve high-quality development. At the same time, higher education institutions should play a leading role in this transformation process.[3] On the one hand, universities should be committed to leading academic development with scientific and technological innovation, with the fundamental task of cultivating top-notch innovative talents, providing talent support for the improvement of regional innovation capabilities. On the other hand, the deep integration of universities and the regional innovation ecology is conducive to cultivating regional innovation momentum with new productive forces as its intrinsic characteristic, thus injecting new momentum into the high-quality development of new productive forces.

The construction of an innovative talent cultivation system is a powerful guarantee for regional industrial transformation and upgrading. [4] It means that in the process of promoting high-quality economic development, optimizing industrial structure, and enhancing competitiveness, the optimal allocation of talent resources and the stimulation of innovation capabilities play a crucial role. The innovative talent cultivation system helps to enhance the overall innovation capability of the region. [5] Innovation is an important driving force for regional economic development, and talent is the main body of innovation. By constructing an innovative talent cultivation system, we can stimulate the innovative vitality of talents, promote the continuous emergence of innovation achievements, thereby enhancing the overall innovation capability of the region, and providing a continuous source of innovation power for regional industrial transformation and upgrading. At the same time, regional characteristics are the lifeline of local university talent cultivation. Local universities should change their talent cultivation concepts, clarify their talent cultivation goals, take innovative talent cultivation as their fundamental task, cultivate various talents for local economic and social development, take improving regional innovation capabilities and regional productivity as the school's goal of serving the local area, further condense the characteristics of serving the local area, focus on cultivating innovation awareness and practical ability, strengthen the pertinence and applicability of talent cultivation, and strive to improve the level of social services.

How to promote regional innovation through higher education talent cultivation is of practical significance for cultivating new productive forces and promoting high-quality economic and social development. Based on panel data from 283 cities in China from 2011 to 2021, this study calculated the higher education talent cultivation index and regional innovation index using the entropy method; secondly, a two-way fixed-effects system was used to analyze the impact of higher education talent cultivation on regional innovation.

2. Literature Review and Theoretical Relationships

Based on the above analysis, this study examines the impact of higher education talent cultivation on regional innovation from the perspective of the relationship between technology and scientific principles. Theoretically speaking, the

influence of higher education talent cultivation on regional innovation capability can be summarized in the following aspects: Firstly, knowledge creation and dissemination. As an important carrier of knowledge creation and dissemination, higher education cultivates scientific and technological talents, who are significant driving forces for regional innovation. These talents drive the innovation and diffusion of new knowledge in the region through research and development activities, project collaboration, and other means, providing a solid talent base for regional innovation. Secondly, technology spillover effect. The scientific and technological talents cultivated by universities often "spill over" their cutting-edge technologies and professional knowledge to other enterprises and institutions in the region through academic exchanges, talent mobility, and other ways, thereby driving the improvement of the technological innovation level of the entire region and enhancing regional innovation capability. Thirdly, fostering an innovative ecosystem. As an essential part of the regional innovation system, higher education's talent cultivation activities can promote university-industry cooperation, government-industry-university-research collaborative innovation, and create a favorable innovative ecological environment, providing necessary support for regional innovation activities. Fourthly, enhancing regional attractiveness. Quality higher education resources can enhance the region's talent attraction, coupled with the cultivation and supply of excellent talents in the region, the agglomeration advantage of regional innovation subjects will be strengthened, further promoting the improvement of regional innovation capability. Fifthly, fostering an innovative culture. Universities can cultivate students' innovative consciousness, innovative thinking, and innovative abilities through curriculum design, practical training, and other methods, contributing to the shaping of a regional innovative culture and thus promoting the overall improvement of regional innovation level. In other words, higher education talent cultivation has a positive impact on regional innovation capability through various mechanisms such as knowledge innovation, technology spillover, fostering an innovative ecosystem, enhancing regional attractiveness, and fostering an innovative culture. This impact effect is reflected not only in directly enhancing regional innovation performance, but also in cultivating regional innovation subjects, optimizing regional innovation environment, and ultimately promoting the continuous improvement of regional innovation capability.

3. Research Design

3.1. Model Specification

For the direct impact of talent cultivation in higher education on regional innovation capabilities, this study establishes the following regression model:

$$INOit = \alpha_0 + \alpha_1 TAL_{it} + \alpha_c Z_{it} + \mu_i + \delta_t + \varepsilon_{it}. \quad (1)$$

In equation (1), TAL_{it} represents talent cultivation in province i in year t ; $INOit$ represents regional innovation capability in province i in year t ; Z_{it} represents a series of control variables; μ represents the individual fixed effect of province i that does not change over time; λ_t represents the time fixed effect; ε_{it} represents the random disturbance term.

3.2. Variable Explanation

3.2.1. Dependent Variable

Regional innovation capability (ino). This study intends to

use regional innovation output as the main indicator to evaluate regional innovation capability. Given that existing studies generally use patent indicators to measure regional technological innovation capability [15], this paper also selects the number of patent applications as a proxy variable for regional innovation output. Compared with the number of patents granted, the number of patent applications can better reflect the actual level of regional innovation activities, because factors such as the patent examination cycle will affect the actual speed of patent authorization. [16] Therefore, this study will use the total number of annual patent applications in each city as a measure of regional innovation capability, with data sourced from relevant statistics of the National Intellectual Property Administration. This indicator can accurately capture the overall level of regional innovation activities and lay a solid foundation for subsequent empirical analysis.

3.2.2. Independent Variable

Talent cultivation in higher education (tal). Scientifically evaluating talent cultivation in higher education is an important issue and an inherent requirement for higher education to shift towards connotative development. In order to balance the logical rationality and empirical reliability of indicator selection, this study first focuses on the concept of talent cultivation in higher education based on its functions. Ultimately, this study retains three indicators to measure talent cultivation in higher education (specific content is shown in Table 1), with relevant data sourced from the China Education Statistics Yearbook, the National Education Funding Execution Statistics Announcement, and the Compilation of Science and Technology Statistics of Colleges and Universities. Referring to previous studies, the number of full-time teachers in ordinary institutions of higher education and the number of ordinary undergraduate and college

students are used as the baseline measurement variables. [17] The increase in per-student education expenditure in colleges and universities has not only a short-term impact on talent cultivation, but more importantly, its long-term accumulated effect is reflected in the continuous improvement of talent quality. Therefore, this study incorporates per-student education expenditure and uses the entropy method to combine it with the number of full-time teachers in ordinary institutions of higher education and the number of ordinary undergraduate and college students, thus constructing the dependent variable of talent cultivation in colleges and universities.

3.2.3. Control Variables

To more accurately estimate the contribution effect of higher education in the process of digital economy development in regions, we also need to set control variables that may affect the development of the digital economy. [16] Referring to previous studies, this study sets the following control variable indicators: industrial structure (Ind), measured by the proportion of the output value of the tertiary industry in GDP, with data sourced from the statistical yearbooks of various cities; economic development level (Econ), measured by per capita GDP, with data sourced from the China Urban Statistical Yearbook; trade structure (trade) is obtained through the entropy method based on the ratio of goods imports to GDP, the ratio of goods exports to GDP, and the actual amount of foreign capital used in the current year, with data sourced from the China Urban Statistical Yearbook; education investment level (inv_edu) is the ratio of education expenditure to GDP, and the Peking University Digital Financial Inclusion Index (pku) is sourced from the Peking University Digital Financial Inclusion Index. Since the data in this study is an unbalanced panel, the year 2021 is corrected using the linear interpolation method.

Table 1. Explanation of index weighting

Indicator Attribute	Primary Indicator Name	Indicator Representation	Indicator Attribute
Explained Variable	Innovation Capability	R&D Internal Expenditure (10,000 yuan)	+
		Total Authorized Patents	+
Explanatory Variable	Talent Cultivation	Number of Full-time Teachers in Regular Colleges and Universities (persons)	+
		Number of Regular Undergraduate and College Students (persons)	+
		Per-student Education Expenditure in Regular Colleges and Universities	+
Control Variable	Digital Economy Index	Digital Economy Index	
	Economic Development Level	Gross Regional Product / Total Population	
	Industrial Structure	Proportion of Primary Industry in Gross Regional Product - City-wide	
		Proportion of Secondary Industry in Gross Regional Product - City-wide	
		Proportion of Tertiary Industry in Gross Regional Product - City-wide	
	Trade Structure	Cargo Imports / Gross Regional Product	
		Cargo Exports / Gross Regional Product	
		Actual Amount of Foreign Capital Utilized in the Current Year	
	Education Investment Level	Education Expenditure / Gross Regional Product	
	Digital Financial Inclusion Index	Digital Financial Inclusion Index	

3.3. Weighting and Variable Measurement in Table-making

This study adopts the entropy method of objective weighting method to determine the index weight and reduce the dimension of indicators through the principle of

information entropy, in order to achieve a comprehensive evaluation of the research object. In order to make the comprehensive evaluation index of different years comparable, this study introduces the time variable to improve the entropy method, making the analysis results more reasonable. Taking the development level of higher education as an example, the specific measurement method is as follows.

Indicator Selection: Due to the different dimensions and units of different indicators, this study uses the range method to process all positive indicators separately to obtain the standard values of the original indicators.

Indicator Standardization: Since the dimensions and units of different indicators vary, this study uses the range method to process all positive indicators separately to obtain the standard values of the original indicators.

$$\tilde{X}_{it,j} = \frac{X_{it,j} - \min\{X_{it,j}\}}{\max\{X_{it,j}\} - \min\{X_{it,j}\}} \quad (2)$$

Calculate the weight of the j-th indicator value of the i-th province's higher education development level in the t-th year:

$$P_{it,j} = \frac{\tilde{X}_{it,j}}{\sum_{i=1}^N \sum_{t=1}^T \tilde{X}_{it,j}} \quad (3)$$

Calculate the information entropy and redundancy of the i-th province's higher education development level in the t-th year for the j-th indicator:

$$e_j = -\frac{1}{\ln(NT)} \sum_{i=1}^N \sum_{t=1}^T P_{it,j} \ln(P_{it,j}) \quad (4)$$

Calculate the weight of the j-th indicator based on the redundancy of information entropy:

$$w_j = \frac{d_j}{\sum_{j=1}^m d_j} \quad (5)$$

Use the multiple linear weighted function method to obtain the higher education development level (HE_i) of the i-th province in the t-th year:

$$HE_{it} = \sum_{j=1}^m w_j \tilde{X}_{it,j} \quad (6)$$

Similarly, this study adopts the above steps to measure the regional innovation capability (M_{it}) of the i-th province in the t-th year.

3.4. Data Sample and Descriptive Statistics

In order to delve deeply into the impact of higher education on the level of regional digital economic development, this study analyzed unbalanced panel data at the municipal level from 2011 to 2021, covering 283 cities nationwide. To ensure the continuity of variable measurement over time, this study used linear interpolation to supplement a small number of missing values. The descriptive statistics of the main variables in this study are presented in Table 2. The results show that there are significant differences in economic development levels among different cities. In contrast, the mean and standard deviation of higher education talent cultivation and regional innovation capability are larger, indicating a more pronounced imbalance in regional higher education talent cultivation. From the perspective of control variables, there are also significant differences among cities in terms of industrial structure, economic development level, and education investment level.

Table 2. Descriptive statistics

VAR	N	mean	sd	min	max
ino	283	233929	543378	278.1	8.72
tal	283	26458	48242	18850	405558
eco	283	0.34	0.11	0.06	0.80
ind	283	19.33	5.22	10.98	44.26
inv_edu	283	0.04	0.02	4.19	0.185
trade	283	-2.68	2.09	-4.922	1.15
qua	283	9.90	3.33	1.88	24.08
pku	283	149.00	74.18	8.74	442.1

4. Empirical Analysis

4.1. Baseline Regression Results

The linear estimation results of the impact of higher education talent cultivation on regional innovation development are shown in Table 3, with columns (1), (2), (3), and (4) representing the regression results after controlling for province fixed effects, time fixed effects, bidirectional fixed effects, and incorporating control variables.

Table 3. Baseline Regression Results

	(1)	(2)	(3)	(4)
Ino				
Tal	4.353** (0.379)	4.305** (0.487)	3.354** (0.527)	3.589** (0.534)
Enc				-1.801** (338832.547)
ind				-5150.087** (3540.247)
inv_edu				125981.990*** (727302.487)
trade				-0.001** (0.000)
qua				4878.696 (8495.577)
pku				397.210 (250.164)
cons	105124.646** (29784.476)	-9970.480 (90181.925)	127740.724*** (17217.098)	210251.049** (93508.213)
id	NO	YES	YES	YES
year	YES	NO	YES	YES
N	283	283	283	283
r ²			0.065	0.065

Standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01

(Materials Text) As indicated in columns (1), (2), and (3) of Table 3, after eliminating the interference of factors such as time variation and individual differences on the research conclusions, the estimated coefficients of the core independent variable, higher education talent cultivation, are significantly positive, indicating that higher education talent cultivation can have a positive impact on the development of regional innovation. This empirical analysis expands the relevant research on the support of higher education talent cultivation for high-quality economic development in the region. In column (4) with the inclusion of control variables, the per capita educational investment level of higher education in each city can significantly positively predict the level of regional innovative development, suggesting a positive correlation between per capita educational investment in higher education and regional innovative development. The estimated coefficient of industrial structure is significantly negative at the 5% level, which may be due to the lagging impact of industrial development transformation on regional innovation.

4.2. Instrumental Variable Method

In studying the impact of higher education talent cultivation on regional innovation development, the regression results based on two-way fixed effects still encounter endogenous challenges, especially the issue of reverse causality, where the structure and resource allocation of higher education talent cultivation may be influenced by

regional innovation. To address this, this study employs the instrumental variable method, which theoretically can alleviate endogeneity overall, to identify the causal effect of regional higher education on digital economic growth. In previous studies, lagging variables is also a commonly used method to mitigate variable endogeneity, and some scholars directly select lagged variables as instrumental variables. [22] This study innovatively uses the interaction term between the lagged one-period talent cultivation index and the number of teachers in ordinary colleges and universities as an instrumental variable. This instrumental variable has no practical meaning but satisfies the weak instrumental variable test. Columns (1) and (2) show the 2SLS regression results without including control variables, while columns (3) and (4) present the 2SLS regression results with the inclusion of control variables.

The results indicate that regardless of whether control variables are included, the F-values in the first stage of the instrumental variable regression are greater than 10, and the DWH endogeneity test is significant at the 1% level, suggesting that the instrumental variables selected in this study are relatively effective. Simultaneously, the estimated coefficient of higher education talent cultivation on regional digital economic development based on the instrumental variable is significantly positive at the 1% level, consistent with the benchmark regression results, further validating the supportive role of higher education talent cultivation in regional innovation.

Table 4. Results of Benchmark Regression Analysis

Variable		(1) First Stage	(2) Second Stage	(3) First Stage	(4) Second Stage
Talent Cultivation (tal)			4.498** (0.263)		2.825* (0.224)
Instrumental Variable (iv)		0.000** (0.000)		0.000* (0.000)	
Control Variables				Controlled	Controlled
Individual Fixed Effect		Controlled	Controlled	Controlled	Controlled
Time Fixed Effect		Controlled	Controlled	Controlled	Controlled
Sample Size		283	283	283	283
Instrumental Variable Validity Test	Weak Instrumental Variable Test (F-value)	99.377		73.756	
	DWH Endogeneity Test (P-value)	0.000		0.000	

5. Conclusion and Suggestions

This study, based on panel data from 283 cities in China from 2011 to 2021, empirically explores the relationship between higher education talent cultivation and regional innovation, drawing the following key conclusions: Firstly, higher education talent cultivation serves as a significant driving force for regional innovation in fostering new-quality productive forces. The empirical results indicate that an increase in the higher education talent cultivation index significantly promotes the improvement of the regional innovation index, and this positive effect remains robust after mitigating endogeneity issues using methods such as instrumental variables. The efforts of universities in cultivating innovative talents provide strong talent support for the enhancement of regional innovation capabilities.

Secondly, the promoting effect of higher education talent cultivation on regional innovation has been strengthening

over time. From a dynamic perspective, the relationship between higher education talent cultivation and regional innovation exhibits a gradually increasing trend. This suggests that with the development of digital intelligence technology and the evolution of digital intelligence civilization, the role of higher education in cultivating innovative talents has become increasingly prominent, injecting sustained momentum into the high-quality development of new-quality productive forces. based on the above research conclusions, the following policy recommendations are proposed:

Strengthen the integration of university-industry cooperation in talent cultivation and regional innovation. Universities should actively align with regional innovation practices, closely connect with the development needs of regional industries, optimize talent cultivation programs, and aim to cultivate innovative talents required for new-quality productive forces. Meanwhile, government departments

should strengthen guidance for universities and promote in-depth collaboration between universities and the regional innovation ecosystem. This includes guiding technological innovation and high-quality labor to empower traditional industries, accelerating their transformation, and forming the foundation for quality changes in new-quality productive forces. It also involves organizing in-depth exploration of the essence and value of advantageous industries and strategic emerging industries, conducting more innovative and forward-looking scientific research, implementing future industry incubation and growth plans, and seizing the commanding heights of future technological revolutions and industrial development. Finally, fostering and strengthening new-quality productive forces through the collaborative cultivation of industry-education-digital intelligence. On one hand, universities can leverage digital intelligence technology to create a new environment for international industrial cooperation, exchange, and open win-win cooperation, absorb global scientific and technological innovations in an open manner, stimulate enterprise innovation vitality through international competition mechanisms, and achieve technological progress and upgrades in digital intelligence through cooperation and competition, serving as an important guarantee for fostering and strengthening new-quality productive forces. On the other hand, universities encourage cross-border innovation incubation and international cooperation in scientific and technological projects through the integration of industry-education-digital intelligence, promote local upgrading and remote derivation of digital intelligence industrial clusters, broaden the strategic depth and maneuvering space for the development of industrial chains, and continuously incubate and nurture strategic emerging industries and future industries suitable for local technology and resource endowments.

Strengthen the cultivation of talent in universities in the digital intelligence era and promote the construction of a "1236" education system. Currently, labor materials represented by digital intelligence technology are leading the development of science. As an academic organization for talent cultivation, universities should actively explore scientific principles, cultivate digital intelligence talents combining various key technologies, and thereby promote new-quality productive forces. To achieve this, university education needs to make corresponding adjustments and construct a "1236" education system, which includes four key elements: value cultivation, human-machine interconnection, collaborative cooperation, and covering different levels.

References

- [1] G. O. Young, "Synthetic structure of industrial plastics (Book style with paper title and editor)," in *Plastics*, 2nd ed. vol. 3, J. Peters, Ed. New York: McGraw-Hill, 1964, pp. 15–64.
- [2] W.-K. Chen, *Linear Networks and Systems* (Book style). Belmont, CA: Wadsworth, 1993, pp. 123–135.
- [3] H. Poor, *An Introduction to Signal Detection and Estimation*. New York: Springer-Verlag, 1985, ch. 4.
- [4] B. Smith, "An approach to graphs of linear forms (Unpublished work style)," unpublished.
- [5] E. H. Miller, "A note on reflector arrays (Periodical style-Accepted for publication)," *IEEE Trans. Antennas Propagat.*, to be published.
- [6] J. Wang, "Fundamentals of erbium-doped fiber amplifiers arrays (Periodical style—Submitted for publication)," *IEEE J. Quantum Electron.*, submitted for publication.
- [7] C. J. Kaufman, Rocky Mountain Research Lab., Boulder, CO, private communication, May 1995.
- [8] Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, "Electron spectroscopy studies on magneto-optical media and plastic substrate interfaces (Translation Journals style)," *IEEE Transl. J. Magn. Jpn.*, vol. 2, Aug. 1987, pp. 740–741 [Dig. 9th Annu. Conf. Magnetics Japan, 1982, p. 301].
- [9] M. Young, *The Technical Writers Handbook*. Mill Valley, CA: University Science, 1989.
- [10] J. U. Duncombe, "Infrared navigation—Part I: An assessment of feasibility (Periodical style)," *IEEE Trans. Electron Devices*, vol. ED-11, pp. 34–39, Jan. 1959.
- [11] S. Chen, B. Mulgrew, and P. M. Grant, "A clustering technique for digital communications channel equalization using radial basis function networks," *IEEE Trans. Neural Networks*, vol. 4, pp. 570–578, Jul. 1993.
- [12] R. W. Lucky, "Automatic equalization for digital communication," *Bell Syst. Tech. J.*, vol. 44, no. 4, pp. 547–588, Apr. 1965.
- [13] S. P. Bingulac, "On the compatibility of adaptive controllers (Published Conference Proceedings style)," in *Proc. 4th Annu. Allerton Conf. Circuits and Systems Theory*, New York, 1994, pp. 8–16.
- [14] G. R. Faulhaber, "Design of service systems with priority reservation," in *Conf. Rec. 1995 IEEE Int. Conf. Communications*, pp. 3–8.
- [15] W. D. Doyle, "Magnetization reversal in films with biaxial anisotropy," in *1987 Proc. INTERMAG Conf.*, pp. 2.2-1–2.2-6.
- [16] G. W. Juette and L. E. Zeffanella, "Radio noise currents in short sections on bundle conductors (Presented Conference Paper style)," presented at the IEEE Summer power Meeting, Dallas, TX, Jun. 22–27, 1990, Paper 90 SM 690-0 PWR5.
- [17] J. G. Kreifeldt, "An analysis of surface-detected EMG as an amplitude-modulated noise," presented at the 1989 Int. Conf. Medicine and Biological Engineering, Chicago, IL.
- [18] J. Williams, "Narrow-band analyzer (Thesis or Dissertation style)," Ph.D. dissertation, Dept. Elect. Eng., Harvard Univ., Cambridge, MA, 1993.
- [19] N. Kawasaki, "Parametric study of thermal and chemical nonequilibrium nozzle flow," M.S. thesis, Dept. Electron. Eng., Osaka Univ., Osaka, Japan, 1993.
- [20] J. P. Wilkinson, "Nonlinear resonant circuit devices (Patent style)," U.S. Patent 3 624 12, July 16, 1990.
- [21] *IEEE Criteria for Class IE Electric Systems* (Standards style), IEEE Standard 308, 1969.
- [22] *Letter Symbols for Quantities*, ANSI Standard Y10.5-1968.
- [23] R. E. Haskell and C. T. Case, "Transient signal propagation in lossless isotropic plasmas (Report style)," USAF Cambridge Res. Lab., Cambridge, MA Rep. ARCL-66-234 (II), 1994, vol. 2.
- [24] E. E. Reber, R. L. Michell, and C. J. Carter, "Oxygen absorption in the Earth's atmosphere," Aerospace Corp., Los Angeles, CA, Tech. Rep. TR-0200 (420-46)-3, Nov. 1988.
- [25] R. J. Vidmar. (1992, August). On the use of atmospheric plasmas as electromagnetic reflectors. *IEEE Trans. Plasma Sci.* [Online]. 21(3). pp. 876–880. Available: <http://www.halcyon.com/pub/journals/21ps03-vidmar>.