Felix Zajac
Professor (Research) of Mechanical Engineering and of Orthopaedic Surgery, Emeritus

Bio

ACADEMIC APPOINTMENTS
• Emeritus Faculty, Acad Council, Mechanical Engineering

Publications

PUBLICATIONS
• All joint moments significantly contribute to trunk angular acceleration *JOURNAL OF BIOMECHANICS*
  Nott, C. R., Zajac, F. E., Neptune, R. R., Kautz, S. A.
  2010; 43 (13): 2648-2652

• Merging of Healthy Motor Modules Predicts Reduced Locomotor Performance and Muscle Coordination Complexity Post-Stroke *JOURNAL OF NEUROPHYSIOLOGY*
  Clark, D. J., Ting, L. H., Zajac, F. E., Neptune, R. R., Kautz, S. A.
  2010; 103 (2): 844-857

• Effect of equinus foot placement and intrinsic muscle response on knee extension during stance *GAIT & POSTURE*
  2006; 23 (1): 32-36

• Muscle contributions to support during gait in an individual with post-stroke hemiparesis *JOURNAL OF BIOMECHANICS*
  Higginson, J. S., Zajac, F. E., Neptune, R. R., Kautz, S. A., Delp, S. L.
  2006; 39 (10): 1769-1777

• Gait differences between individuals with post-stroke hemiparesis and non-disabled controls at matched speeds *GAIT & POSTURE*
  Chen, G., Patten, C., Kothari, D. H., Zajac, F. E.
  2005; 22 (1): 51-56

• Gait deviations associated with post-stroke hemiparesis: improvement during treadmill walking using weight support, speed, support stiffness, and handrail hold *GAIT & POSTURE*
  Chen, G., Patten, C., Kothari, D. H., Zajac, F. E.
  2005; 22 (1): 57-62

• Muscle mechanical work requirements during normal walking: the energetic cost of raising the body's center-of-mass is significant *JOURNAL OF BIOMECHANICS*
  Neptune, R. R., Zajac, F. E., Kautz, S. A.
  2004; 37 (6): 817-825

• Muscle force redistributes segmental power for body progression during walking *GAIT & POSTURE*
  Neptune, R. R., Zajac, F. E., Kautz, S. A.
  2004; 19 (2): 194-205

• Biomechanics and muscle coordination of human walking Part II: Lessons from dynamical simulations and clinical implications *GAIT & POSTURE*
  Zajac, F. E., Neptune, R. R., Kautz, S. A.
  2003; 17 (1): 1-17

• Biomechanics and muscle coordination of human walking - Part I: Introduction to concepts, power transfer, dynamics and simulations *GAIT & POSTURE*
Zajac, F. E., Neptune, R. R., Kautz, S. A.

- Mutability of bifunctional thigh muscle activity in pedaling due to contralateral leg force generation JOURNAL OF NEUROPHYSIOLOGY
  2002; 88 (3): 1308-1317

- Understanding muscle coordination of the human leg with dynamical simulations JOURNAL OF BIOMECHANICS
  Zajac, F. E.
  2002; 35 (8): 1011-1018

- Nonuniform shortening in the biceps brachii during elbow flexion JOURNAL OF APPLIED PHYSIOLOGY
  2002; 92 (6): 2381-2389

- Contributions of the individual ankle plantar flexors to support, forward progression and swing initiation during walking JOURNAL OF BIOMECHANICS
  Neptune, R. R., Kautz, S. A., Zajac, F. E.
  2001; 34 (11): 1387-1398

- Bicycle drive system dynamics: Theory and experimental validation JOURNAL OF BIOMECHANICAL ENGINEERING-TRANSACTIIONS OF THE ASME
  Fregly, B. J., Zajac, F. E., Dairaghi, C. A.
  2000; 122 (4): 446-452

- Contralateral movement and extensor force generation after flexion phase muscle coordination in pedaling JOURNAL OF NEUROPHYSIOLOGY
  Ting, L. H., Kautz, S. A., Brown, D. A., Zajac, F. E.
  2000; 83 (6): 3351-3365

- Muscle contributions to specific biomechanical functions do not change in forward versus backward pedaling JOURNAL OF BIOMECHANICS
  Neptune, R. R., Kautz, S. A., Zajac, F. E.
  2000; 33 (2): 155-164

- In vivo tracking of the human patella using cine phase contrast magnetic resonance imaging JOURNAL OF BIOMECHANICAL ENGINEERING-TRANSACTIIONS OF THE ASME
  Sheehan, F. T., Zajac, F. E., Drace, J. E.
  1999; 121 (6): 650-656

- Ankle and hip postural strategies defined by joint torques GAIT & POSTURE
  Runge, C. F., Shupert, C. L., Horak, F. B., Zajac, F. E.
  1999; 10 (2): 161-170

- Locomotor strategy for pedaling: Muscle groups and biomechanical functions JOURNAL OF NEUROPHYSIOLOGY
  Raasch, C. C., Zajac, F. E.
  1999; 82 (2): 515-525

- Phase reversal of biomechanical functions and muscle activity in backward pedaling JOURNAL OF NEUROPHYSIOLOGY
  Ting, L. H., Kautz, S. A., Brown, D. A., Zajac, F. E.
  1999; 81 (2): 544-551

- Role of vestibular information in initiation of rapid postural responses EXPERIMENTAL BRAIN RESEARCH
  Runge, C. F., Shupert, C. L., Horak, F. B., Zajac, F. E.
  1998; 122 (4): 403-412

- Sensormotor state of the contralateral leg affects ipsilateral muscle coordination of pedaling JOURNAL OF NEUROPHYSIOLOGY
  Ting, L. H., Raasch, C. C., Brown, D. A., Kautz, S. A., Zajac, F. E.
  1998; 80 (3): 1341-1351

- Large index-fingertip forces are produced by subject-independent patterns of muscle excitation JOURNAL OF BIOMECHANICS
  Valero-Cuevas, F. J., Zajac, F. E., Burgar, C. G.
  1998; 31 (8): 693-703
• Bilateral integration of sensorimotor signals during pedaling  *Conference on Neuronal Mechanisms for Generating Locomotor Activity*
  NEW YORK ACAD SCIENCES.1998: 513–516

• Using cine phase contrast magnetic resonance imaging to non-invasively study in vivo knee dynamics  *JOURNAL OF BIOMECHANICS*
  Sheehan, F. T., Zajac, F. E., Drace, J. E.
  1998; 31 (1): 21-26

• Muscle coordination of maximum-speed pedaling  *JOURNAL OF BIOMECHANICS*
  Raasch, C. C., Zajac, F. E., Ma, B. M., Levine, W. S.
  1997; 30 (6): 595-602

• Crank inertial load has little effect on steady-state pedaling coordination  *JOURNAL OF BIOMECHANICS*
  Fregly, B. J., Zajac, F. E., Dairaghi, C. A.
  1996; 29 (12): 1559-1567

• A state-space analysis of mechanical energy generation, absorption, and transfer during pedaling  *JOURNAL OF BIOMECHANICS*
  Fregly, B. J., Zajac, F. E.
  1996; 29 (1): 81-90

• ESTIMATING NET JOINT TORQUES FROM KINESIOLOGICAL DATA USING OPTIMAL LINEAR-SYSTEM THEORY  *IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING*
  1995; 42 (12): 1158-1164

• MODELING AND SIMULATION OF PARAPLEGIC AMBULATION IN A RECIPROCATING GAIT ORTHOSIS  *JOURNAL OF BIOMECHANICAL ENGINEERING-TRANSACTIONS OF THE ASME*
  Tashman, S., Zajac, F. E., Perkash, I.
  1995; 117 (3): 300-308

• COMPENSATING FOR CHANGES IN MUSCLE LENGTH IN TOTAL HIP-ARTHROPLASTY - EFFECTS ON THE MOMENT GENERATING CAPACITY OF THE MUSCLES  *CLINICAL ORTHOPAEDICS AND RELATED RESEARCH*
  Vasavada, A. N., Delp, S. L., Maloney, W. J., Schurman, D. J., Zajac, F. E.
  1994: 121-133

• HUMAN STANDING POSTURE - MULTIJOINT MOVEMENT STRATEGIES BASED ON BIOMECHANICAL CONSTRAINTS  *SYMP ON NATURAL AND ARTIFICIAL CONTROL OF HEARING AND BALANCE, IN HONOR OF PROFESSOR CARL RUDOLF PFALTZ*
  Kuo, A. D., Zajac, F. E.
  ELSEVIER SCIENCE PUBL B V.1993: 349–358

• HUMAN STANDING POSTURE - MULTIJOINT MOVEMENT STRATEGIES BASED ON BIOMECHANICAL CONSTRAINTS  *PROGRESS IN BRAIN RESEARCH*
  Kuo, A. D., Zajac, F. E.
  1993; 97: 349-358

• A BIOMECHANICAL ANALYSIS OF MUSCLE STRENGTH AS A LIMITING FACTOR IN STANDING POSTURE  *13TH CONGRESS OF THE INTERNATIONAL SOC OF BIOMECHANICS*
  Kuo, A. D., Zajac, F. E.
  PERGAMON-ELSEVIER SCIENCE LTD.1993: 137–150

• MUSCLE COORDINATION OF MOVEMENT - A PERSPECTIVE  *13TH CONGRESS OF THE INTERNATIONAL SOC OF BIOMECHANICS*
  Zajac, F. E.
  PERGAMON-ELSEVIER SCIENCE LTD.1993: 109–124

• WHAT IS THE NATURE OF THE FEEDFORWARD COMPONENT IN MOTOR CONTROL  *BEHAVIORAL AND BRAIN SCIENCES*
  Kuo, A. D., Zajac, F. E.

• FORCE-GENERATING AND MOMENT-GENERATING CAPACITY OF LOWER-EXTREMITY MUSCLES BEFORE AND AFTER TENDON LENGTHENING  *CLINICAL ORTHOPAEDICS AND RELATED RESEARCH*
  Delp, S. L., Zajac, F. E.
1992: 247-259

- How musculotendon architecture and joint geometry affect the capacity of muscles to move and exert force on objects: a review with application to arm and forearm tendon transfer design. *Journal of Hand Surgery*
  Zajac, F. E.
  1992; 17 (5): 799-804

- How musculotendon architecture and joint geometry affect the capacity of muscles to move and exert force on objects - a review with application to arm and forearm tendon transfer design. *Journal of Hand Surgery - American Volume*
  Zajac, F. E.
  1992; 17A (5): 799-804

  Kuo, A. D., Zajac, F. E.
  UNIV OREGON BOOKS. 1992: A344–A347

- Neuromuscular alterations with different body orientations during cyclical movement. *11th International Symposium of the Society for Postural and Gait Research - Posture and Gait: Control Mechanisms, 1992*
  Brown, D. A., Dairaghi, C. A., Stevenson, P. J., Wu, M., Zajac, F. E.
  UNIV OREGON BOOKS. 1992: A155–A158

- Optimal muscular coordination strategies for jumping. *Journal of Biomechanics*
  Pandy, M. G., Zajac, F. E.
  1991; 24 (1): 1-10

- Restoring unassisted natural gait to paraplegics via functional neuromuscular stimulation - a computer-simulation study. *IEEE Transactions on Biomedical Engineering*
  Yamaguchi, G. T., Zajac, F. E.
  1990; 37 (9): 886-902

- An interactive graphics-based model of the lower-extremity to study orthopedic surgical-procedures. *IEEE Transactions on Biomedical Engineering*
  1990; 37 (8): 757-767

- Biomechanical analysis of the Chiari pelvic osteotomy - preserving hip abductor strength. *Clinical Orthopaedics and Related Research*
  Delp, S. L., Bleck, E. E., Zajac, F. E., Bollini, G.
  1990: 189-198

- An optimal-control model for maximum-height human jumping. *Journal of Biomechanics*
  Pandy, M. G., Zajac, F. E., Sim, E., Levine, W. S.
  1990; 23 (12): 1185-1198

- A musculoskeletal model of the human lower-extremity - the effect of muscle, tendon, and moment arm on the moment angle relationship of musculotendon actuators at the hip, knee, and ankle. *Journal of Biomechanics*
  Hoy, M. G., Zajac, F. E., Gordon, M. E.
  1990; 23 (2): 157-169

- Paraplegic standing controlled by functional neuromuscular stimulation. 2. Computer-simulation studies. *IEEE Transactions on Biomedical Engineering*
  Khang, G., Zajac, F. E.
  1989; 36 (9): 885-894

- Paraplegic standing controlled by functional neuromuscular stimulation. 1. Computer-model and control-system design. *IEEE Transactions on Biomedical Engineering*
  Khang, G., Zajac, F. E.
  1989; 36 (9): 873-884
• MUSCLE AND TENDON - PROPERTIES, MODELS, SCALING, AND APPLICATION TO BIOMECHANICS AND MOTOR CONTROL. CRITICAL REVIEWS IN BIOMEDICAL ENGINEERING
  Zajac, F. E.
  1989; 17 (4): 359-411

• A PLANAR MODEL OF THE KNEE-JOINT TO CHARACTERIZE THE KNEE EXTENSOR MECHANISM. JOURNAL OF BIOMECHANICS
  Yamaguchi, G. T., Zajac, F. E.
  1989; 22 (1): 1-10

• DETERMINING MUSCLES FORCE AND ACTION IN MULTI-ARTICULAR MOVEMENT. EXERCISE AND SPORT SCIENCES REVIEWS/SERIES
  Zajac, F. E., Gordon, M. E.
  1989; 17: 187-230

• A MECHANICALLY DECOUPLED 2 FORCE COMPONENT BICYCLE PEDAL DYNAMOMETER. JOURNAL OF BIOMECHANICS
  Newmiller, J., Hull, M. L., Zajac, F. E.
  1988; 21 (5): 375-?

• THIGH MUSCLE-ACTIVITY DURING MAXIMUM-HEIGHT JUMPS BY CATS. JOURNAL OF NEUROPHYSIOLOGY
  Zajac, F. E.
  1985; 53 (4): 979-994

• MAXIMAL HEIGHT JUMPING - OPTIMAL STRATEGIES BASED ON A STUDY OF THE HEEL-OFF TO LIFT-OFF PHASE OF PROPULSION
  Zajac, F. E., Levine, W. S., Cho, Y. M., Zomlefer, M. R.
  PERGAMON-ELSEVIER SCIENCE LTD. 1985: 243–43

• RELATIONSHIP AMONG RECRUITMENT ORDER, AXONAL CONDUCTION VELOCITY, AND MUSCLE UNIT PROPERTIES OF TYPE-IDENTIFIED MOTOR UNITS IN CAT PLANTARIS MUSCLE. JOURNAL OF NEUROPHYSIOLOGY
  Zajac, F. E., Faden, J. S.
  1985; 53 (5): 1303-1322

• DEPENDENCE OF JUMPING PERFORMANCE ON MUSCLE PROPERTIES WHEN HUMANS USE ONLY CALF MUSCLES FOR PROPULSION. JOURNAL OF BIOMECHANICS
  Zajac, F. E., Wicke, R. W., Levine, W. S.
  1984; 17 (7): 513-523

• ANKLE CONTROLS THAT PRODUCE A MAXIMAL VERTICAL JUMP WHEN OTHER JOINTS ARE LOCKED. IEEE TRANSACTIONS ON AUTOMATIC CONTROL
  Levine, W. S., Zajac, F. E., Belzer, M. R., Zomlefer, M. R.
  1983; 28 (11): 1008-1016

• HINDLIMB MUSCULAR-ACTIVITY, KINETICS AND KINEMATICS OF CATS JUMPING TO THEIR MAXIMUM ACHIEVABLE HEIGHTS. JOURNAL OF EXPERIMENTAL BIOLOGY
  Zajac, F. E., Zomlefer, M. R., Levine, W. S.
  1981; 91 (APR): 73-86