Chapter 4 concerns itself with life data. In addition, how the B-models perform when confronted with life data from a number of sources. We employ four parameter sets when a stationary model suffices; five when a nonstationary model is needed. Parameter estimations may be accomplished by (*a*) method of moments (MOME), (*b*) maximum likelihood estimates (MLE), and (*c*) method of least squares. The most plausible procedure requires a model with least number of parameters and permits the most convenient parameter estimate method in extracting useful information concerning CD process for generalized life data. The data selected was (*a*) Birnbaum-Saunders et al. (stresses at 21, 26, 36 ksi), (*b*) Sweet & Kozin (stresses at 25, 30.5 and 34 ksi), (*c*) Schijve-Jacobs (low cycle fatigue-30 replications), (*d*) Nauman (NACATND-1584; 31 failed specimens showed that B-models can examine quality of data), and (*e*) Hahn & Shapiro (wear tests of 16 specimens). Based on analysis, the B-model MOME and Weibull MLE agree quite well for the abovementioned data. Based on a number of available test data, great care is required in reporting experiments and collection of data. Continuing, nonstationary behavior can arise from time-dependent loading, i.e., changing natural properties and change in environment. The B-model estimates crack growth data. In attempting to estimate higher central moments, they exhibit very large irregularities and are unacceptable for purposes of parameter estimation.

The final chapter reports on the uses of B-models. Spectrum loading is the initial topic and B-model provides a good representation. It is also pointed out that the Palmgren-Miner (PM) rule gives poor comparison since PM does not take the order of loading into account. However, the B-model does through its matrix multiplication. B-models of CD make it possible to examine accelerated testing in some detail. This can be accomplished in 8 ways. The most prominent are (*a*) careful use of increased frequency by not changing material properties, (*b*) censoring, i.e., tests terminated at specific time (t_0) before all items have failed for tests terminated at time of particular number of failures, (*c*) spectrum loading and deletion of all low amplitude loads, and (*d*) changed environments, initial conditions, change of loading or changes in loading conditions. Each possesses good and bad points but the B-models offer a procedure in which these possibilities can be studied analytically and numerically prior to testing. The B-model construction employing S/N diagrams can be useful to the engineer. It includes variability and still possesses a reasonably comprehensive structure. Comparing with previous CD models, they were either too simple, too complex, or parameter estimation too difficult. The problems of maintainability and reliability on mechanical components subjected to fatigue, fatigue crack growth, and wear can be easily accomplished by judicious choice of the B-model. Design process can utilize the B-model in a number of ways without compromising the important design goals.

In summary, this is an excellent book. Care must be taken due to its use of mathematical concepts. The reviewer believes a separate table showing the abbreviated terms and what they represent would be a great boon to the reader. In addition, the reviewer would like to see an extension of the B-model to (*a*) combined random and applied load, and (*b*) Gaussian and Rayleigh loading. The reviewer further believes that this method will be adopted and become more useful as analysts and engineers become more familiar with its applications.

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All large machine foundations should be considered as serious engineering problems. The small ones can be omitted but consideration should be given as to their vulnerability. The larger ones are prone to vibration. This imposes dynamic loads on the foundation. The designer must factor this into his design. Previously, static loads multiplied by a dynamic factor was ample. This was considered as a static problem with an increased static load. No mention of the actual safety factor was considered. Due to this uncertainty, the value of the "dynamic factor" was too high. On a number of occasions, harmful deformations occurred during operations, even though this large factor was used. This caused "eyes to pop" and an investigation of dynamic loads was then in order. We must pay particular attention to mechanical foundations since harmful cracking and objectionable unequal settling must be avoided. Machine bases usually carry heavy loads; this requires deep foundations. They are usually placed below ground water level. This may entail the use of pile foundations. Densification of the soil or stabilization may be additional problems. "All in all," design of machine foundations is a crucial dynamics problem.

The book consists of 4 parts and 15 chapters.

Chapter 1 discusses, in general, machine foundations. It touches upon the development methods and their importance in design. Chapter 2 plunges into the fundamentals of the theory of vibrations. It covers harmonic with a brief introduction to random vibration, i.e., probability density, autocorrelation, and power spectral density. Free vibration with and without damping and energy considerations are next on the agenda. This leads to damped and undamped single and two degree of freedom vibration with further consideration given to vibration excited rotating masses, impact, and impulse dynamic loading. Having this under our belt, we forge ahead in studying systems with multidegrees of freedom, i.e., Rayleigh and Holzer's method and Dunkerly's approximate method. The chapter concludes with a brief discussion of vibrations of systems with many degrees of freedom. This consists of natural frequency of transverse vibration of slabs and that of prismatic structures with constant cross-section. Three examples illustrating these features are studied and explained in this chapter.

Chapter 3 classifies machine foundations as simple or block foundations and complex foundations. Chapter 4 states fundamental principles for the design of machine foundations plus helpful hints. Examples are furnished of foundations based on European practice. Chapter 5 describes the building materials for machine foundations. Opening this chapter is the behavior of materials under alternating loads with a good introduction to fatigue, Goodman diagram, elastic properties of materials plus their respective formulas. Building materials are brick, stone, plain and reinforced concrete, metals and timber. Vibration and sound absorbing materials are cork and its proper installation, rubber, felt, polyvinyl chloride (PVC), and other synthetic materials. Helical springs are probably the best vibration absorbers and materials for protecting machine foundations against harmful chemical action of acids, salts, and alkalis.

The next chapter covers the principles of computation for machine foundations. The author opens up the chapter by briefly discussing the six modes of vibration (3 rotational and 3 translational) about the coordinate axis plus active and passive vibration. In analyzing the elastically supported foundation replete with extensive allied equations, the vertical vibration with and without regard to the soil is explained. Ad-

ditional comments are made concerning rotational vibration and vibration at horizontal displacement. Continuing, we next meet the differential equations and the proper solution of vibrations from simultaneous occurrences of vertical and horizontal, linear, and rotational displacments of the foundations. This includes natural vibration, forced vibration, influence of eccentric position of moving mass plus all of the foundation. The chapter concludes with a brief summary of forced vibrations excited by rotating masses.

Chapter 7 reports on the instrumentation and equipment for generating dynamic forces and vibration measurements. The varied equipment used in generating forces are (*a*) Hertwig's vibrating machine for large scale investigations, (*b*) Geodyne equipment for investigating dynamic properties of soils, (*c*) small field vibrators, (*d*) exciters for classifying the behavior of dams, and (*e*) electrodynamic exciters for building investigations. The necessary instruments for measuring vibration are (*a*) well known mechanical vibrometers (Geiger vibrograph), (*b*) electomechanical pickup head (strain-gage), (*c*) oscilloscopes (moving coil and cathode ray). For the measurement, the phase displacement of the pickup head is used. The vibration measuring arrangement consists of (*a*) vibration pickup, (*b*) free amplifiers, (*c*) analyzer, and (*d*) recorder.

Park II encompasses the interaction between soil and foundation. Chapter 8 explains the dynamic effects on the soil and their examination. The initial topic is dynamic soil investigation in general. This continues with means for measuring soil vibration plus equations for determining the velocity of propagation of waves in soils. The author examines existing foundations and goes into detail using examples of (*a*) compressor foundations, (*b*) small machinery foundations (*c*) harmful vibrations in a rotor-generator assembly, (*d*) vibrations from moulding machines, and (*e*) vibration of a turbogenerator and building. A good chapter to be read by all!

Chapter 9 continues with the elastic properties of soils. This entails the constant characterization of the elastic deformation of the soil which is complete with elastic equations of equilibrium. The next topic is Poisson's ratio-elastic modulus of soils. The elastic deformation of soils embraces uniform and nonuniform displacement of soils. The chapter concludes with vibration analysis of pile foundation and horizontal loading on foundations. The chapter is complete with equations and explanations.

Chapter 10 considers the behavior of soils under dynamic loads. A number of important happenings are in order. They are (*a*) soil friction and adhesion under dynamic loads, i.e., friction decreases as acceleration of vibration increases and approaches an asymptotic value, (*b*) coefficient of viscosity (vibration and shock tend to make soil behave like a fluid), (*c*) void ratio (ratio of pore volume to volume of soil), (*d*) relative density of soil, and (*e*) curve of vibrational compression (relationship of void ratio to ratio of vibration acceleration in gravity). Additional features of soils under dynamic loads are (*a*) settlement due to static pressure and simultaneous pressure, and (*b*) settlement of large bodies due to frontal vibration.

The next chapter continues with dynamic soil properties for design purposes. This entails the use of earthwaves. They are (*a*) dilation waves or P-waves, and (*b*) Rayleigh waves. In order to obtain further information the following are used (*a*) transient tests, (*b*) steady state test by means of vertical oscillations, and (*c*) field tests on models.

With this information under our belt, we step ahead into the design methods used for dynamically loaded foundations. Beginning with interaction of the many facets of soils and foundations, we continue with the theory of elastic half space, vibration systems with lumped parameters which employ some features of the elastic half space.

Chapter 14 discusses experimental study of foundation vibration. The author examines vertical vibration, experimental studies on damping coefficients of various foundations plus vibration of foundations built on piles and experimental study of horizontal vibration. The chapter concludes with further experimental studies of foundations regarding verification of half space theory and experiments of vibrations by model vibration tables. A most interesting chapter; it is complete with mathematical design equations.

The last chapter discusses vibration tolerance and the effect of vibration on the human organism and on buildings. We must determine the effect of vibration on the human organism. This is fully explained by charts and tables showing the threshold of vibration perception and annoyance. The chapter concludes with criteria for vibration in machinery foundation design. A very complete chapter!

In summary, this is an excellent book. Most books on vibration barely mention machine foundations and soil properties under dynamic actions. The reviewer would prefer seeing some sections on analog data processing with an introduction to digital data processing. The tables for list of symbols, conversion factors, and abbreviations are excellent. Although the book mentions civil engineering, the mechanical engineer would learn a lot from this tome. The reviewer does recommend this book to those interested in mechanical dynamic analysis of machine foundations.