the motion of an infinite linear system of discrete masses, connected by springs. The solution is obtained indirectly by a limiting process from the solution for a finite number of masses, and is then verified directly. The main features of the oscillations of a given mass are interpreted in terms of familiar properties of the Bessel functions of the time which occur as coefficients.

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THE DECOMPOSITION OF MODULAR SYSTEMS CONNECTED WITH THE DOUBLY GENERALIZED FERMAT THEOREM.

BY PROFESSOR ELIAKIM HASTINGS MOORE.

(Read before the Chicago Section of the American Mathematical Society, December 29, 1898.)

Introduction. The Generalized Fermat Theorem (A) *in Purely Arithmetic Phrasing* (A', A'') *with Extension* (A'''). §§ 1–5.

1. The theorem * in question is the following:

(A) In the Galois field $GF[p^n]$ of prime modulus p and of rank n the two forms each of degree $(p^{n(k+1)}-1)/(p^n-1)$ in the $k+1$ indeterminates $X_0, X_1, \cdots, X_k$

$$D_{k+1,n,p}[X_0, X_1, \cdots, X_k] = | X_j^{p^{ni}} | \qquad (i, j = 0, 1, \cdots, k)$$

$$P_{k+1,n,p}[X_0, X_1, \cdots, X_k] = \prod_{g=0,k} \prod_{\alpha_{fg}|p^n} (X_g + \sum_{f=0,g-1} \alpha_{fg} X_f)$$

are identical:

$$D_{k+1,n,p}[X_0, \cdots, X_k] = P_{k+1,n,p}[X_0, \cdots, X_k].$$

Here the subscript remark $\alpha_{fg}|p^n$ indicates that the mark α_{fg} is to run over the p^n marks of the Galois field $GF[p^n]$, and for the case $g=0$ the final $\sum_{f=0,g-1}$ does not enter.

For this theorem, which for $(k, n) = (1, 1)$ is one form of Fermat's theorem, I have given three proofs, couched as is the statement of the theorem in the abstract Galois field phrasing introduced by me in the paper "A doubly-infinite system of simple groups" presented to the Chicago Congress of 1893.

* Moore, "A two-fold generalization of Fermat's theorem," BULLETIN, vol. 2 (1896), pp. 189–199.